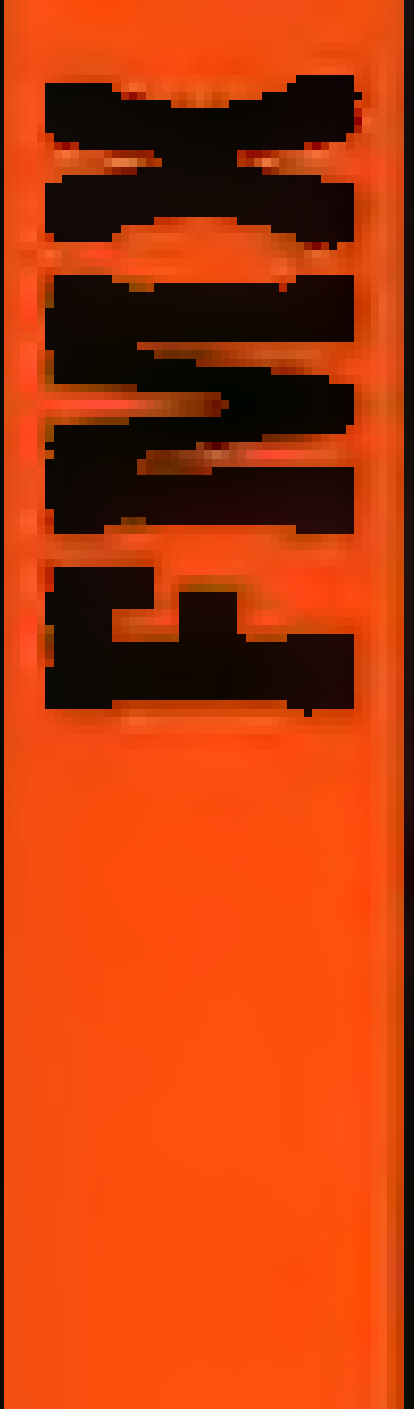
FMM
The Revised Black Book

FOR ACADEMIC STUDY ONLY

This work is dedicated to:

Daniel, who fueled my curiosity,
Pete, who shared the risk of research,
SL and Bill, for their help in the writing process,
and all those who developed the data
upon which this work was built

That we may all stand on equal ground
and thereby consent to peaceful means

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A BRIEF INTRODUCTION TO EXPLOSIVES

In essence, an explosive is a liquid or solid material, or a mixture of liquid and solid materials, that is very rapidly converted to a gas or gasses by the application of heat or a sharp blow. There are two main classes of explosives: "low" and "high."

Low explosives are usually a mixture of two or more materials that burn very rapidly. The rate of burning depends on the materials involved, how well they are mixed, the pressure they are under, and how they are ignited. Because the burn rate is dependent upon pressure, low explosives must be tightly contained before they can be made to explode. Low explosives also are usually much less powerful then high explosives.

High explosives do not "burn" as such; rather, they detonate. Detonation is the instantaneous decomposition of an explosive along a shock wave. Because high explosives break down this way, it is not always necessary to contain this type of explosive in order to use it effectively.

High explosives are further divided into primary, secondary, and tertiary explosives. Primary explosives can be made to detonate by the application of a spark or flame. They also tend to be rather sensitive to impact and friction. Primary explosives are not usually used as demolition or weapon charges; instead, they are normally used to make blasting caps.

Secondary explosives are difficult or impossible to detonate with a spark or flame. In order to detonate these materials, it is necessary to use a blasting cap to create a high-velocity shock wave. These explosives are generally safer to

handle and are used as demolition and weapon charges.

The term tertiary refers to explosives that are very difficult to detonate. The dividing line between secondary and tertiary is rather vague, so in this book all explosives that are not primary explosives will be referred to as secondary.

HOW TO USE THIS BOOK

In an effort to make this book as useful as possible, quite a bit of technical information has been included. Because of this, it has been necessary to use unusual abbreviations and formatting. While at first this may seem to make the book somewhat difficult to read, I believe it will help prevent the reader from misunderstanding instructions. When dealing with explosives, misunderstandings can be deadly.

The first item to discuss is the general layout of the book. It has been divided into several sections in order to make it easier to find specific information. These sections are listed in the table of contents. Each section is then organized in alphabetical order; for example, if you want to find information on nitrocellulose, turn to the section entitled "Descriptions and Manufacturing of Explosives." There you will find all of the explosives presented in alphabetical order.

The second item I wish to discuss is format. In several areas of the book, there are lists of materials presented in the following format :

Sea water/10 u.b.w. OR
    Water/9 u.b.w. AND
    Salt/1 u.b.w.
Sugar/0.5 u.b.w.

This means that either sea water OR a mixture of water AND salt could be used, but because sea water would be the better choice, it is listed first. Generally, materials are listed in order of preference. The word OR is used to show that one material may be substituted for another. The word AND indicates that if the material that precedes it is used (in this case, water), then the material immediately following (in this case, salt) must also be used. Indenting is also

used to identify materials that may be used as substitutions.

The last subject that needs to be addressed is the meaning of abbreviations and terms used in this book. In the preceding example, the abbreviation "u.b.w." is used. This stands for "units by weight." For explosives that contain only liquid components, a "p.b.v." (parts by volume) measurement is given as well.

An explanation of all abbreviations and many technical terms appears in the glossary. Please, refer to it if you have *any* doubt about the meaning of *any* term used in this book. Again, a misunderstanding could be deadly. If you come across a unfamiliar word that is not listed in the glossary, look it up in either a standard or technical dictionary.

SAFETY RULES

The manufacture of explosives is a *very* hazardous undertaking. It is also illegal without specialized permits and licenses. Unless you have had professional training in chemistry and/or explosives manufacture, *do not* attempt any of the procedures in this manual.

This entire book was written with the assumption that under the circumstances when this information is needed, a certain amount of risk to life is acceptable. None of the procedures in this book could truly be called safe, but in dire times, safety is a luxury we may not be able to afford.

Ignoring any of these safety precautions is a very good way to get yourself killed. Although you may be able to get away with it a few times, in the end, it WILL catch up with you.

ALWAYS read the instructions from start to finish before beginning any manufacturing process. It is also a good idea to reread these safety precautions before starting *any* project in this book.

Before beginning any manufacturing process, read about the materials you are going to handle in the section entitled "Component Materials." If you don't, you may use the wrong grade of nitric acid or sulfuric acid with fatal results. Remember, all chemicals used should be "technical grade" or better unless the instructions say otherwise.

Never use any chemical that you have not positively identified. Identifying a chemical by common name alone *does not* qualify as positive identification.

At least once, read the glossary from start to finish. Refer to it again if you later have *any* doubt about the meaning of *any* term used in this book.

Never mix any chemicals that you are not specifically told to mix. Experimenting WILL get you killed.

Never allow a tool or container that has had contact with one chemical to contact a second chemical until it has been thoroughly cleaned and dried.

Always wear *heavy duty* safety goggles. Safety glasses are not enough.

Always wear heavy protective gloves. Acid and accidental explosions are hard on fingers.

If possible, wear soft body armor when working with explosives. This may sound extreme, but if there is an accident, you will be very glad you took this seriously.

Do not smoke or have open flames anywhere near explosives.

Keep the work area neat. Accidentally spilling one chemical onto another could get you killed.

Many of the dusts and vapors from the explosives and components are very toxic. Always have good ventilation in the work area. At the *absolute least* you should always wear a dust mask. If you plan to work with these materials for any length of time, get and read the "Material Safety Data Sheet" for that material.

Avoid skin contact with both the explosives and the chemicals used to make them, as many of these substances are very poisonous. If contact does occur, flush the area of contact with a large amount of water. If you plan to work with these materials for any length of time, get and read the "Material Safety Data Sheet" for that material.

Do not allow iron or steel tools to either bang or scrape together near explosives. They produce small hot sparks that will set off many types of explosives.

Always be very gentle when handling explosives.

Always work in small batches (the smaller the better). This will significantly reduce injures in the event of an accidental explosion.

If any instruction is unclear, or if any of the information provided appears inconsistent, or if you have any doubts at all, then STOP then and there. Do not attempt to use that procedure until you are able to verify through a reliable source that what you are doing is correct and that all of the information provided is correct. Every effort has been made to ensure the accuracy of information provided, but it is always possible that a mistake could have been made. That is why critical information such as ignition points and impact sensitivities are presented in two forms. THE FINAL RESPONSIBILITY FOR SAFETY IS YOURS.

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EXPLOSIVES TO AVOID

This is a list of explosives that were intentionally not covered in this book. It is my opinion that these explosives are too dangerous to be of substantial value to the reader. I gave very careful thought before leaving any explosive out of this book. This entire book was written with the assumption that under the circumstances when this information is needed, a certain amount of risk to life is acceptable. None of the procedures in this book could truly be called safe, but in dire times, safety is a luxury we may not be able to afford. *However*, the following materials are so dangerous that I am unable to provide methods of manufacture or handling that provide any reasonably degree of safety.

Ammonia hydroxide and iodine—This material is EXTREMELY impact sensitive. Loud noises may cause it to detonate.

Ammonium nitrate and any chlorate—These materials may SPONTANEOUSLY ignite. They are also EXTREMELY spark and friction sensitive.

Ammonium nitrate and copper powder—This material may SPONTANEOUSLY ignite. It is also EXTREMELY friction sensitive.

Nitrosugars—These materials have been known to SPONTANEOUSLY detonate.

Potassium chlorate and aluminum—This material is EXTREMELY spark and friction sensitive.

Potassium chlorate and magnesium—This material is EXTREMELY spark and friction sensitive.

Potassium chlorate and red phosphorus—This material

may SPONTANEOUSLY ignite. It is also EXTREMELY spark and friction sensitive.

Potassium chlorate and sugar—This material is EXTREMELY spark sensitive. The smallest static electricity spark could set it off.

Potassium chlorate and sulfur—This material may SPONTANEOUSLY ignite. It is also EXTREMELY spark and friction sensitive.

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GLOSSARY

acid-resistant container-- Any container made of glass, ceramic, pyrex, or a nonstick (Teflon) coated cooking pot. For example, a drinking glass or a ceramic bowl. This is referred to as a Type I container.

AN—Ammonium nitrate.

ANFO—Ammonium nitrate/fuel oil. This is an explosive mixture used in large scale blasting operations.

approx.—Approximately.

blasting cap—A small tube (usually metal) containing a primary explosive. It is used for initiating a secondary explosive. In this book, "blasting cap" refers to a #8 cap.

booster charge—A small charge of easily detonated explosives. It is used to initiate another charge of explosives that is more difficult to detonate.

brisance—The shattering power of an explosive.

C—Centigrade. A measure of temperature.

castable explosive—An explosive material that can be melted and poured to create shaped charges.

cc—Cubic centimeters.

charge—A block of explosives.

deflagration temp.—The temperature at which an explosive either bursts into flame or detonates.

detonation—An explosion occurring at a very high speed as a result of a sustained shock wave.

detonation cord—A special cord filled with PETN used to connect several charges that are to be detonated at the same time.

detonation rate—See *detonation velocity*.

detonation velocity—The speed at which a column of the explosive will explode: i.e., how quickly the explosion will travel through the explosive.

detonator—*See blasting cap.*

dilute—To make a material less concentrated by the addition of water or other liquid.

double boiler—A method of heating. A pot or pan is filled with water and then a smaller pot is placed into the larger. The material you wish to heat is then placed in the smaller pot. This prevents the temperature of the smaller pot from rising above 100°C (212°F) as long as there is water in the larger pot. NOTE: The smaller container must NOT rest directly on the bottom of the larger container. A few small pebbles work fine as a spacer.

e.n.u.—Exact number unavailable.

F—Fahrenheit. A measure of temperature.

filter paper—Paper specially designed to separate solids from liquids. Coffee filters are made of this material.

friction sensitivity—This is a measure of the friction normally required to detonate an explosive. In this book, this information is provided in kp. It is also given in general terms according to the following table:

kp	Label
0 to 1	extremely high
1+ to 3	very high
2+ to 4	high
3+ to 5	moderately high
4+ to 6	moderate
5+ to 10	moderately low
10+	low

g—Gram. A unit of weight or mass.

heat-resistant container—A cooking pot/pan made of pyrex, ceramic, stainless steel, steel, iron, or one with a nonstick (Teflon) coating. This is referred to as a Type II container. Do NOT use aluminum, brass, copper, or any material not specifically listed, as it may react explosively with the material you are using.

heat/acid-resistant container—A cooking pot/pan made of pyrex, ceramic, or one that is nonstick (Teflon) coated. This is referred to as a Type III container.

hex.—Hexamethlylenetetramine. A component of RDX.

high explosive—Any explosive that detonates.

hot water bath—A method of heating. A small container is set in a large pan. Hot water is slowly poured into the pan so that it surrounds the smaller container.

ice water bath—A method of cooling. A large pan is filled with water, ice, and a small amount of salt. A second pot or pan is set in the ice water. This serves to keep whatever is in the second pot or pan cold.

impact sensitivity—This is a measure of the impact normally required to detonate an explosive. In this book, this information is provided in Nm. It is also given in general terms according to the following table:

Nm	Label
0 to 1	extremely high
1+ to 3	very high
3+ to 4	high
4+ to 5	moderately high
5+ to 11	moderate
11+ to 20	moderately low
20+	low

initiate—To cause an explosive to explode.

kg—Kilogram. 1000 grams. A unit of weight or mass.

kp—Kilo-pascal.

lb—Pound. 16 ounces. A unit of weight.

lead block test—A test used to compare the strength of an explosive. Ten grams of the explosive are placed into a hole that has been drilled into a large block of lead. The explosive is then detonated and the size of the resulting cavity is measured in cubic centimeters. The larger the cavity, the more powerful the explosive

low explosive—An explosive that "burns" at a high speed but does not detonate.

ml—Milliliter. A measure of volume.

m/s—Meters per second. A measure of velocity.

M.S.D.S.—Material Data Safety Sheet. This is a report on the hazards of a given chemical. It is a standardized publica-

tion that should be available in any public library.

NLX—Nitromethane Liquid Explosive.

Nm—Newton-meter. A measure of work or energy.

oz—Ounce. A unit of weight.

p.b.v.—Parts by volume. This is an alternate method for measuring chemical ingredients. It is only listed when all the chemicals to be used are liquids.

PETN—Pentaeryhritol tetranitrate. An explosive.

plastic—The capability to be molded as clay; i.e., an explosive is plastic if you can mold it like clay.

prills—Small round pellets.

primary explosive—An explosive that will detonate if exposed to a small flame or spark.

RDX—Cyclonite. An explosive.

s.g.—Specific gravity. See *sp. gr.*

sp. gr.—Specific gravity. This is another way of saying density.

squib—A small tube (usually metal) filled with a low explosive that produces a very hot flame when initiated. Squibs are used to set off low explosives and in certain circumstances may be used to set off high explosives.

sublimation—The "evaporation" of a solid material. That is, the conversion of a solid directly to a gas.

tertiary—An explosive that cannot be made to detonate with a blasting cap alone. Instead, a booster charge must be used with the blasting cap.

Type I container—See *acid-resistant container.*

Type II container—See *heat-resistant container.*

Type III container—See *heat/acid-resistant container.*

u.b.w.—Units by weight.

w/—With.

water sensitivity—This is a measure of how much water an explosive can have contact with and still remain effective for use. The rating system used in this book is given in the following table:

Label	Explanation
extremely high	explosive must always be stored in an airtight container or it will absorb moisture from the air and be ruined
high	explosive may be stored in an open container for a short period of time before use
moderate	explosive may be stored in an open container, but direct contact with water must be avoided
low	useable when SLIGHTLY damp
none	may be used under water

ACETONE PEROXIDE

Explosive type: high—primary
Det. rate: 5200 m/s
Lead block test: e.n.u.
Chem. formula: C6H12O4
Form: white crystals
Deflagration temp.: e.n.u.
Impact sensitivity: extremely high—e.n.u.
Friction sensitivity: extremely high—e.n.u.
Water sensitivity: e.n.u.
Initiate with: spark

There is relatively little information readily available on acetone peroxide. This material is a reasonably effective primary explosive. However, it is highly volatile. Because of its volatile properties, it should always be stored in an airtight container.

MANUFACTURE:

Chemicals required:
- Hydrogen peroxide (6% solution)/25.5 u.b.w.-25 p.b.v.
- Sulfuric acid/2.25 u.b.w.—1.25 p.b.v.
- Acetone/12 u.b.w.—15.15 p.b.v.
- Water
- Salt

Other materials required:
- 1 acid-resistant container (Type I)
- Large pan
- Glass thermometer
- Filter paper
- Stirring rod (glass or ceramic)

Procedure:

1. Pour the acetone into the acid-resistant container.
2. Gently stir the hydrogen peroxide into the acetone.
3. Fill the pan with a mixture of ice, water, and a little salt. Place the container with the acetone/peroxide mixture into the pan of ice water and cool the acetone/peroxide mixture to 5°C (41°F). A freezer may be used instead of the ice water bath for this step.
4. While continuing to cool the mixture with the ice water bath, slowly (one drop every 10 seconds) stir the sulfuric acid into the acetone/peroxide mixture. This will cause the temperature of the acetone/peroxide mixture to rise. If the temperature approaches 10°C (50°F), stop adding sulfuric acid and continue stirring until the mixture cools to 5°C (41°F).
5. After the last of the sulfuric acid has been added, continue to stir the mixture for 5 minutes.
6. The mixture must now be allowed to stand in a cold place for 24 hours. The mixture may be left in an ice water bath or it may be placed in a refrigerator for this time period.
7. Crystals of acetone peroxide will settle out of the mixture. Filter these crystals out of the mixture using the filter paper.
8. Slowly pour 5 u.b.w. of COLD water over the crystals to wash away impurities.
9. To dry the material, place the acetone peroxide in an acid-resistant container and set the container in a pan of hot (80°C/176°F) water. WARNING: This material is a primary explosive—handle very gently.
10. Store in an acid-resistant/airtight container.

ACETYLENE

Explosive type: high—secondary
Det. rate: 2500 m/s as a solid
Lead block test: 300cc as a solid
Chem. formula: C2H2
Form: colorless gas
Deflagration temp.: 335°C (635°F)
Impact sensitivity: e.n.u.
Friction sensitivity: e.n.u.
Water sensitivity: depends on container
Initiate with: special (see below)

Under the proper conditions, acetylene will detonate as a high explosive. The acetylene must be under high pressure or high temperature for this to work. The simplest way to detonate acetylene is to place an explosive charge on a high-pressure canister of acetylene and then detonate the charge. The initiator charge placed on the canister must be powerful enough to VERY FORCEFULLY breach the walls of the canister.

MANUFACTURE:

Chemicals required:
Acetylene (high-pressure canister)

Other materials required:
Initiator charge

Procedure:
1. Prepare the initiator charge.

NOTE: A diamond charge or saddle charge works very well as an initiator. If you are not familiar with these charges, simply wrap a ring of a plastic explosive around the canister. The ring of explosive should be at least twice as thick and

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four times as wide as the thickness of the metal used to make the walls of the canister.

AMATOL 50/50

Explosive type: high—secondary
Det. rate: 6400 m/s
Lead block test: 250cc
Chem. formula: mixture of TNT and ammonium nitrate
Form: white or off-white solid
Deflagration temp.: e.n.u.—over 200°C (392°F)
Impact sensitivity: moderately low—e.n.u.
Friction sensitivity: low—e.n.u.
Water sensitivity: high
Initiate with: blasting cap

Amatol is an effective way to stretch available materials if a castable explosive is needed and only a limited amount of TNT is available. Amatol contains ammonium nitrate and therefore must not be allowed to come in contact with brass or copper. Amatol can be made in ratios other than 50/50. Mixtures containing as much as 80% by weight of ammonium nitrate can be made. Amatols that contain a higher percentage of ammonium nitrate will be slightly less powerful and slightly more difficult to detonate than the 50/50 mixture.

MANUFACTURE:

Chemicals required:
- TNT/5 u.b.w
- Ammonium nitrate/5 u.b.w
- Water (for double boiler)

Other materials required:
- Heat source
- 1 large pan
- 1 heat-resistant container (Type II)
- Stirring rod (glass or wood)

- Glass thermometer
- Small pebbles

Procedure:

1. Fill the pan with water and several small pebbles, then place the pan on the heat source. The purpose of the pebbles is to prevent the second container from resting directly on the bottom of the first container.
2. Place the TNT into the heat-resistant container.
3. Place the heat-resistant container into the pan of water and SLOWLY heat the TNT to 90°C (194°F); then turn off the heat. NOTE: The TNT will melt at about 80°C (176°F).
4. Slowly stir in one-tenth of the powdered ammonium nitrate. The mixture will cool and begin to harden.
5. Turn the heat on again until the temperature of the TNT/AN mixture returns to 90°C (194°F), then turn the heat off again.
6. Repeat steps 4 and 5 until all of the ammonium nitrate has been added to the mixture.
7. The explosive is now complete. It may be reheated to 90°C (194°F) using the double boiler and spooned/poured into a storage container.

AMMONIUM PICRATE

Also called: Explosive D
Explosive type: high—secondary
Det. rate: 7150 m/s
Lead block test: 280cc
Chem. formula: C6H6N4O7
Form: yellow or red crystals
Deflagration temp.: 320°C (608°F)
Impact sensitivity: moderately low—e.n.u.
Friction sensitivity: moderate—e.n.u.
Water sensitivity: moderate
Initiate with: 14g (0.5oz) booster, blasting cap

Ammonium picrate is a moderately powerful explosive with a high detonation rate. The color of this material varies from yellow to red. The red form is less stable and easier to detonate. The color of the material is greatly affected by two factors of the manufacturing process. The first is the amount of ammonium hydroxide used. If an excess amount of ammonium hydroxide is used, the material will be red. If somewhat less is used, the material will be more yellow. The second factor is the rate at which the ammonium hydroxide is added to the picric acid solution. The faster the two materials are mixed, the more red (sensitive) the material will be. The red form of this material can be detonated with a blasting cap. The yellow form should be detonated with a 14g (0.5oz) booster charge.

MANUFACTURE:

Chemicals required:
- Picric acid/1 u.b.w.
- Ammonium hydroxide (3% solution)/amount varies
- Water

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Other materials required:
- 1 heat/acid-resistant container (Type III)
- Heat source
- Stirring rod (glass or ceramic)
- Large pan
- Filter paper

Procedure:

1. Pour 4.5 u.b.w. of water into the heat/acid-resistant container. Heat the water to a low boil.

2. Remove the water from heat. Stir the picric acid into the hot water. Not all of the picric acid crystals will dissolve.

3. If you are manufacturing the yellow form, SLOWLY stir the ammonium hydroxide solution into the water/picric acid mixture. Stop adding ammonium hydroxide *as soon as* the last of the picric acid crystals dissolve.

If you are manufacturing the red form, stir the ammonium hydroxide solution into the water/picric acid mixture until the last of the picric acid crystals dissolve. Then rapidly stir in an additional 4.5 u.b.w. of the ammonium hydroxide solution.

4. Allow the mixture to stand for one hour.

5. Fill the pan with ice and water.

6. Place the container of water/picric acid/ammonium hydroxide into the large pan of ice water. Keep the container in the ice water until the water/picric acid/ammonium hydroxide mixture cools to 5°C (41°F). Crystals will settle out of the mixture.

7. Filter the crystals out of the mixture using the filter paper. These crystals are ammonium picrate.

8. The ammonium picrate must now be dried. This can be done several different ways. Three methods are listed below.

A) The material can be dried using the sun. Spread the ammonium picrate out on a large flat surface and leave in

direct sunlight for several hours. This will only work if the air temperature is over 25°C (77°F).

B) The material can be dried using a hot water bath. Place a small amount of material in the bottom of an acid-resistant container (Type I). Fill a pan with hot (90°C—194°F) water and then place the container in the pan. Refill the pan with hot water as it cools.

C) The ammonium picrate can be dried using an oven. First preheat the oven to 100°C (212°F). Then turn the oven off and wait 10 minutes. Place a small amount of ammonium picrate in the bottom of a large acid-resistant container. Place the container into the oven. Let the material stay in the oven until either it is completely dry or the oven cools below 50°C (122°F). If the oven has cooled but the material is not dry, take the ammonium picrate out of the oven and reheat the oven to 100°C (212°F). Again, turn the oven off and wait 10 minutes before placing the material back in the oven. Repeat this process until the material is dry. When using this method, it is a good idea to double-check the oven temperature with a second thermometer—if the oven is too hot, the material may explode.

If you use some other method, be sure to dry the material in small batches of about 14g (0.5oz) so that if it should detonate, the damage will be minimized.

AMMONIUM POWDER

Explosive type: low and high—secondary
Det. rate: 3500 m/s max.
Lead block test: e.n.u.
Chem. formula: mixture of NH_4NO_3 and charcoal
Form: dry gray or black powder
Deflagration temp.: approx. 170°C (338°F)
Impact sensitivity: low—e.n.u.
Friction sensitivity: low—e.n.u.
Water sensitivity: extremely high
Initiate with: blasting cap, squib, or fuse

This explosive contains ammonium nitrate and therefore must not be allowed to come in contact with copper or brass. Ammonium powder can be used as both a high and low explosive. When used as a high explosive, a booster charge of at least 500g (1 lb.) should be used. Also, when this material is used as a high explosive, it should not be tightly packed, as this makes the material very difficult to detonate. Lastly, the finer the ammonium nitrate and charcoal are powdered, the better the explosive will work.

MANUFACTURE:

Chemicals required:
Ammonium nitrate/8.5 u.b.w.
Wood charcoal/1.5 u.b.w.

Other materials required:
1 container (heat- OR acid-resistant OR plastic)
1 wooden stirring rod (stick, wooden spoon, etc.)

Procedure:
1. Powder the ammonium nitrate. Use any convenient method. Crushing it between two bricks works fairly well.

2. Powder the charcoal. Use any convenient method. Again, two bricks work well. If you are going to use the same tool to powder both chemicals, *clean it well* between uses.

3. Place the ammonium nitrate and the charcoal into the container and mix gently but thoroughly. For the sake of safety, do not mix more then 250g (8 oz) at a time. The more finely powdered the ammonium nitrate and charcoal are, the more effective the explosive will be.

4. Store the mixture in a waterproof container.

AN DYNAMITE

Also called: Semigelatin dynamite
Explosive type: high—secondary
Det. rate: approx. 3500 m/s
Lead block test: approx. 350cc
Chem. formula: mixture of AN, a nitric ester, and sawdust.
Form: off-white damp powder
Deflagration temp.: e.n.u.
Impact sensitivity: high—e.n.u.
Friction sensitivity: low—e.n.u.
Water sensitivity: low
Initiate with: blasting cap

AN dynamite is an effective way to stretch available materials if you have ammonium nitrate and need a cap-sensitive explosive. This material should be stored in an airtight container if possible. The addition of 0.1 u.b.w. of nitrocellulose improves water resistance.

MANUFACTURE:

Chemicals required:
- Ammonium nitrate/8 u.b.w.
- Nitroglycol/1.5 u.b.w. OR
  - Nitroglycerin/1.5 u.b.w. OR
  - Methyl nitrate/1.5 u.b.w.
- Fine sawdust/0.5 u.b.w. OR
  - Flour (wheat)/0.5 u.b.w.

Other materials required:
- 1 shallow pan (any Type)
- Stirring rod (wooden)
- 1 piece of window screen

Procedure:

1. Sift the sawdust through a piece of screen to remove any large wood fragments.

2. Place the ammonium nitrate and sawdust into the pan. Stir until the two materials are well mixed.

3. SLOWLY and GENTLY pour the nitroglycol over the ammonium nitrate/sawdust mixture. Allow this mixture to stand for 30 minutes. This final mixture should be slightly damp but not wet. If the nitroglycol does not appear to have been COMPLETELY absorbed, then GENTLY add more of the ammonium nitrate/sawdust blend to the mix. It is safer to have this mixture too dry than too wet.

ANFO

Explosive type: high—secondary
Det. rate: 3300 m/s
Lead block test: 316cc
Chem. formula: mixture of NH4NO3 and fuel o l
Form: damp off-white powder or prills
Deflagration temp.: e.n.u
Impact sensitivity: low—e.n.u.
Friction sensitivity: low—e.n.u.
Water sensitivity: high
Initiate with: 28g (1oz) booster charge (only if powdered)
A blasting cap may be used but performance is reduced.

ANFO explosives are very difficult to detonate unless the AN is finely powdered. If you use powdered AN, be careful to avoid tightly packing the explosive, as this will also make it difficult to detonate the material. If slightly less diesel fuel than the recommended amount is used, the material will be slightly more sensitive but also a bit less powerful. If AN prills are used, a booster charge of AT LEAST 500g (1 lb.) must be used. The power of this explosive may be increased by adding 15% by weight of finely powdered aluminum. Finally, ANFO charges must be at least 2 inches in diameter or they will not detonate properly.

MANUFACTURE:

Chemicals required:

Ammonium nitrate (prills or powdered)/9 u b.w
Diesel fuel/.5 u.b.w. OR
Gasoline/.25 u.b.w. AND
Motor oil/.25 u.b.w

Other materials required:

Container (heat OR acid resistant OR plast c)

Stirring rod (wood or plastic)

Procedure.

1. Place the ammonium nitrate into the container.
2. Sprinkle the diesel fuel onto the ammonium nitrate. Do not "stir" these materials, as that will cause them to pack together.
3. Let stand for 1 hour.
4. Store in a waterproof container.

NOTE: If powdered ammonium nitrate is being used and it becomes packed, it may be fluffed by rubbing a handful back and forth across a piece of screen or a cheese grater.

ASTROLITE A

Explosive type: high—secondary
Det. rate: 7800 m/s
Lead block test: e.n.u.
Chem. formula: mixture
Form: silvery liquid
Deflagration temp.: e.n.u.
Impact sensitivity: low—e.n.u.
Friction sensitivity: low—e.n.u.
Water sensitivity: none
Initiate with: 28g (1oz) booster charge, blasting cap

Astrolite A is an extremely powerful explosive. Although it can be detonated with a blasting cap, a 28g (1oz) booster charge greatly improves performance.

MANUFACTURE:

Chemicals required.

Ammonium nitrate/2 u.b.w.
Hydrazine (anhydrous)/1 u.b.w.
Aluminum (powdered or flaked)/0.6 u.b.w.

Other materials required:

1 acid-resistant container (Type I)
1 stirring rod (glass or ceramic)

Procedure:

1. Pour the ammonium nitrate into the acid-resistant container.
2. Slowly pour a small amount of hydrazine into the ammonium nitrate. This will cause the mixture to bubble quite a bit, so wait until the bubbling stops before adding more hydrazine. Continue this process until all the hydrazine has been added to the mixture. NOTE: the fumes from this process are toxic.

3. Gently stir the mixture for five minutes.
4. Gently stir the aluminum powder into the mixture.
5. The explosive is now ready for use. Store in an acid-resistant container.

ASTROLITE G

Explosive type: high secondary
Det. rate: 8600 m/s
Lead block test: e.n.u.
Chem. formula:—mixture
Form: clear liquid
Deflagration temp.: e.n.u
Impact sensitivity: low—e.n.u.
Friction sensitivity: low—e.n.u.
Water sensitivity: none
Initiate with: 28g (1oz) booster charge, blasting cap

Astrolite G is an extremely powerful explosive. Although it can be detonated with a blasting cap, a 28g (1oz) booster charge greatly improves performance.

MANUFACTURE:

Chemicals required:
Ammonium nitrate/2 u.b.w.
Hydrazine (anhydrous)/1 u.b.w.

Other materials required:
Acid-resistant container (Type I)
Glass stirring rod

Procedure:
1. Pour the ammonium nitrate into the acid-resistant container.
2. Slowly pour a small amount of hydrazine into the ammonium nitrate. This will cause the mixture to bubble quite a bit, so wait until the bubbling stops before adding more hydrazine. Continue this until all the hydrazine has been added to the mixture. NOTE: The fumes from this process are toxic.

3. Gently stir the mixture for five minutes.

4. The material is now ready for use. Store in an acid-resistant container.

BLACK POWDER

Explosive type: low
Burn rate: 500 m/s max.
Chem. formula: mixture of KNO3, S, and charcoal
Form: dry gray or black powder
Deflagration temp.: 300°C (572°F)
Impact sensitivity: e.n.u.
friction sensitivity: e.n.u.
Water sensitivity: high
Initiate with: squib, fuse, or blasting cap

Black powder is a rather low-powered explosive, more suitable for use as a propellant or an incendiary than as an explosive charge. But, if tightly contained, it will work reasonably well. Also, the finer you granulate the powder the more explosive it will be, so use the finest screen available to granulate the powder.

PREFERRED METHOD OF MANUFACTURE:

Chemicals required:

Potassium nitrate/7.8 u.b.w. OR
Sodium nitrate/7.8 u.b.w.
Wood charcoal (powdered)/1.5 u.b.w.
Sulfur (powdered)/1 u.b.w
Methyl alcohol/10 u.b.w. OR
Isopropyl alcohol(70+% pure)/10 u.b.w. OR
Ethyl alcohol (70+% pure)/10 u.b.w.
Water/5 u.b.w.

Other materials required:

1 heat-resistant container
1 wooden stirring rod (stick, wooden spoon, etc.)
Screen (metal or stiff plastic) with .25 inch or smaller openings. Screen should be at least 6x12 inch OR

Cheese grater (metal or plastic)
Cloth (shirt, sheet, etc.) at least 18"x18"
Heat source

Procedure:

1. Place the potassium nitrate, charcoal, sulfur, and 5 u.b.w. of water into the heat-resistant container and stir well.

2. Place the heat-resistant container on the heat source and stir until small bubbles appear or until the mixture becomes hot to the touch. DO NOT boil mixture or allow it to dry on the sides of the container, as it may ignite.

3. Remove the mixture from heat and allow to cool to room temperature.

4. Pour the alcohol into the mixture and stir well.

5. Strain the mixture through the cloth.

6. Wrap cloth around mixture and gently squeeze out the remaining liquid.

7. Granulate the black powder by rubbing a small handful across the screen or the finer openings on a cheese grater.

8. The black powder must now be dried. This can be done several different ways. Three methods are listed below.

A) The powder can be dried using the sun. Spread the black powder out on a large flat surface and leave in direct sunlight for several hours. This will only work if the air temperature is over 25°C (77°F).

B) The powder can be dried using a hot water bath. Place about 1cm (0.4in) of powder in the bottom of an acid-resistant container (Type I). Fill a pan with hot water and then place the container in the pan. Refill the pan with hot water as it cools.

C) The powder can be dried using an oven. First preheat the oven to 100°C (212°F). Then turn the oven off and wait 10 minutes. Place a small amount of black powder in the bottom of a large pot or pan. Place the pot/pan into the oven. Let the material sit in the oven until either it is completely dry or the oven cools below 50°C (122°F). If the oven

has cooled but the powder is not dry, take the black powder out of the oven and reheat the oven to 100°C (212°F). Again, turn the oven off and wait 10 minutes before placing the black power back in the oven. Repeat this process until the powder is dry. When using this method, it is a good idea to double-check the oven temperature with a second thermometer—if the oven is too hot, the material may explode.

If you use some other method, be sure to dry the black powder in small batches of about 26g (1oz) so if the powder does ignite accidentally, the damage will be minimized.

9. It may be necessary to repeat step 7 if the black powder has clumped together.

10. The powder can be made into finer grains (if necessary) by spreading a TEASPOONFUL of the powder at a time onto a flat surface and then gently crushing it. Be sure to keep the rest of the powder well away from the powder that is being crushed in case the powder that is being crushed should ignite.

11. Store in a waterproof container.

ALTERNATE METHOD OF MANUFACTURE:

Chemicals required:
Potassium nitrate/9 u.b.w. OR
Sodium nitrate/10 u.b.w.
Wood charcoal (powdered)/1.5 u.b.w.
Sulfur (powdered)/1 u.b.w
Water/5 u.b.w.

Other materials required:
1 heat-resistant container (metal, ceramic, etc.)
1 wooden stirring rod (stick, wooden spoon, etc.)
Screen (metal or stiff plastic) with .25 inch or smaller openings. Screen should be at least 6x12 inch OR
Cheese grater (metal or plastic)

Cloth (shirt, sheet, etc.) at least 18x18 inch
Heat source (stove, hot plate, fire, etc.)

Procedure:

1. Place the potassium nitrate, charcoal, sulfur, and 5 u.b.w. of water into the heat-resistant container and stir well.

2. Place the container on heat source and stir until small bubbles appear or until the mixture becomes hot to the touch. DO NOT boil mixture or allow it to dry on the sides of the container, as it may ignite.

3. Remove the mixture from heat and allow to cool until the mixture feels slightly cool to the touch.

4. Strain the mixture through the cloth.

5. Wrap the cloth around the mixture and gently squeeze out the remaining liquid.

6. Granulate the black powder by rubbing a small handful across the screen or cheese grater.

7. Dry using one of the methods listed in step 8 of the PREFERRED METHOD OF MANUFACTURE.

8. It may be necessary to repeat step 6 if the black powder has clumped together.

9. The powder can be made into finer grains (if necessary) by spreading a TEASPOONFUL of the powder at a time onto a flat surface and then gently crushing it. Be sure to keep the rest of the powder well away from the powder that is being crushed in case the powder that is being crushed should ignite.

10. Store in a waterproof container.

BLACK POWDER (DRY MIXED)

Explosive type: low
Burn rate: 350 m/s max.
Chem. formula: mixture of KNO3, S, and charcoal
Consistency: dry gray or black powder
Deflagration temp.: 300°C (572°F)
Impact sensitivity: e.n.u.
Friction sensitivity: e.n.u.
Initiate with: squib, fuse, or blasting cap

Dry mixed black powder is somewhat less powerful then regular black powder. Again, it is more suitable for use as a propellant or incendiary than as an explosive charge, but if tightly contained, it will work reasonably well. Also, the effectiveness of the explosive depends on how finely the ingredients are powdered BEFORE the powder is mixed.

MANUFACTURE:

Chemicals required:
Potassium nitrate (powdered)/7.5 u.b.w. OR
Sodium nitrate (powdered)/7.5 u.b.w.
Wood charcoal (powdered)/1.5 u.b.w.
Sulfur (powdered)/1 u.b.w. OR
Sucrose/1 u.b.w.

Other materials required:
1 container (any type)
1 wooden stirring rod (stick, wooden spoon, etc.)

Procedure:

1. Place the potassium nitrate, sulfur, and charcoal into container and mix gently but thoroughly. For the sake of safety, do not mix more then 100g (4oz) at a time.

2. Store the mixture in a waterproof container

BLASTING GELATIN

Explosive type: high—secondary
Det. rate: 7200 m/s
Lead block test: 600 cc
Chem. formula: mix of nitroglycerin and nitrocellulose
Form: light yellow gelatin
Deflagration temp.: 200°C (392°F)
Impact sensitivity: very high—2 Nm
Friction sensitivity: moderately low—8 kp
Water sensitivity: none
Initiate with: 28g (1oz) booster charge, blasting cap

Although the impact sensitivity of blasting gelatin is listed as "very high," it is sometimes difficult to detonate with a blasting cap. When possible, a 28g (1oz) booster charge should be used. This does not mean that you can ignore the "very high" impact sensitivity rating; handle this explosive with great care.

MANUFACTURE:

Chemicals required:
Nitroglycerin/9 u.b.w.
Nitrocellulose/1 u.b.w.
Water

Other materials required:
Heat source
Large pan
1 heat-resistant container (Type II)
Glass thermometer

Procedure:
1. Fill the pan with water and heat the water to 72°C (160°F).

2. Remove the pan from heat.
3. Very GENTLY pour the nitroglycerin into the container
4. Place the container into the pan of warm water.
5. Allow the temperature of the nitroglycerin to rise to 50°C (122°F). If temperature starts to exceed 50°C (122°F), then gently remove the container of nitroglycerin from the pan of water and allow it to cool to 40°C (104°F) before placing it back into the warm water. If the water in the pan cools and is no longer able to heat the nitroglycerin, remove the container of nitroglycerin from the pan and reheat the water. Do NOT leave the nitroglycerin container in the pan when you reheat the water.
6. Slowly and gently stir the nitrocellulose into the warmed 50°C (122°F) nitroglycerin.
7. Allow the mixture to stand at air temperature for 2 hours.
8. Store in an airtight container.

CHEDDITE (TYPE O)

Explosive type: high—secondary
Det. rate: 3500 m/s max.
Lead block test: e.n.u.
Chem. formula: mixture of KClO3 or NaClO3 and an oil
Form: white semiplastic paste
Deflagration temp.: e.n.u.
Impact sensitivity: very high—3 Nm
Friction sensitivity: very high—e.n.u.
Water sensitivity: moderate
Initiate with: blasting cap

Cheddite (type O) is a moderately powered explosive. However, because it is rather plastic, it is useful for quickly manufacturing low-powered shaped charges. It is also very simple to produce.

MANUFACTURE:

Chemicals required:
- Potassium chlorate (powdered)/9 u.b.w. OR
  - Sodium chlorate (powdered)/9 u.b.w
- Petroleum jelly/1 u.b.w. OR
  - Castor oil/0.9 u.b.w. OR
  - Kerosene/0.9 u.b.w. OR
  - Diesel oil/0.9 u.b.w. OR
  - Cooking oil (any type)/0.9 u.b.w.

Other materials required:
- 1 container (heat- OR acid-resistant OR plastic)
- 1 wooden stirring rod (stick, wooden spoon, etc.)

Procedure:
1. Place the ingredients into a container and mix gen-

tly but thoroughly. For the sake of safety, do not mix more then 14g (0.5oz) at a time.
2. Store the mixture in a waterproof container.

CHEDDITE (TYPE 90/10)

Explosive type: high—secondary
Det. rate: 2500 m/s
Lead block test: 250cc
Chem. formula: mixture of NH_4ClO_4 and an oil
Form: semiplastic paste
Deflagration temp.: 200°C (392°F)
Impact sensitivity: very high—1.5 Nm
Friction sensitivity: very high—e.n.u.
Water sensitivity: moderate
Initiate with: blasting cap

Cheddite (type 90/10) is a moderately powered explosive. However, because it is rather plastic, it is useful for quickly manufacturing low-powered shaped charges. It is also very simple to produce.

MANUFACTURE:

Chemicals required:
Ammonium perchlorate (powdered)/9 u.b.w.
Petroleum jelly/1 u.b.w. OR
Castor oil/0.9 u.b.w. OR
Kerosene/0.9 u.b.w. OR
Diesel oil/0.9 u.b.w. OR
Cooking oil (any type)/0.9 u.b.w.

Other materials required:
1 container (heat- or acid-resistant or plastic)
1 wooden stirring rod (stick, wooden spoon, etc.)

Procedure
1. Place the ingredients into a container and mix GENTLY but thoroughly. For the sake of safety, do not mix more then 14g (0.5 oz) at a time.

COMPOSITION C

Explosive type: high—secondary
Det. rate: 7400 m/s
Lead block test: 325cc
Chem. formula: mixture of RDX and petroleum jelly
Form: plastic
Deflagration temp.: e.n.u.
Impact sensitivity: moderate—e.n.u.
Friction sensitivity: low—e.n.u.
Water sensitivity: none
Initiate with: blasting cap

Composition C is a powerful plastic explosive. It is one of the predecessors to modern C4. Military C4 uses 10% polyisobutlene as a plasticizer and would be difficult to manufacture in the field. WARNING: As was stated in the safety section of this book, respiratory protection must be used when performing this procedure. RDX dust is toxic.

MANUFACTURE:

Chemicals required:
RDX/8.8 u b.w.
Lecithin/0.1 u.b w.
Petroleum jelly/1.1 u.b.w. OR
Castor oil/1.1 u b.w. OR
Vegetable oil/1.1 u.b.w.

Other materials required:
Wooden board
Rolling pin
1 heat-resistant container (Type II
1 container (any Type)
Stirring rod (wood)

Procedure:

1. Using the wooden board and rolling pin, crush ONE HALF TEASPOON of RDX at a time into a fine powder. Do NOT grind the RDX. Grinding could cause the RDX to detonate. Also, keep the rest of the RDX several meters away from the material you are crushing. For the sake of both safety and effectiveness, it is important that there are no uncrushed granules of RDX in the powder.

2. Place the powdered RDX into a container of any type.

3. Place the petroleum jelly into the heat-resistant container and place the container on the heat source. Using low heat, melt the petroleum jelly.

4. Stir the lecithin into the melted petroleum jelly. The lecithin helps prevent the formation of large RDX crystals, which would increase the sensitivity of the material. It is possible to make composition C without using lecithin, but the resulting material will be less safe to handle.

5. Gently stir the hot petroleum jelly/lecithin mixture into the RDX and mix well. Working in small batches makes this easier and safer.

6. If this material is to be stored for a long time, it should be stored in an airtight container. If composition C is left exposed to air for a long period of time, the material will harden, thereby losing its plastic properties. If this happens, the material can be softened by dipping it in vegetable oil and letting it stand for 1 hour. Then gently knead the material until it becomes soft. Repeat this step if necessary.

CTC-AL

Explosive type: high—secondary
Det. rate: e.n.u.
Lead block test: e.n.u.
Chem. formula: mixture of carbon tetrachloride and aluminum
Form: thick slush
Deflagration temp.: e.n.u.
Impact sensitivity: e.n.u.
Friction sensitivity: e.n.u.
Water sensitivity: high
Initiate with: blasting cap

There is very little specific information readily available on this explosive because it is not used commercially. This explosive must be stored in an airtight container or the carbon tetrachloride will evaporate. Also, CTC-AL must be used within 72 hours of manufacture—after that time, it will lose most or all of its effectiveness.

MANUFACTURE:

Chemicals required:
Carbon tetrachloride/1 u.b.w OR
Tetrachloroethylene/1 u.b.w.
Aluminum (powder)/1.85 u.b.w.

Other materials required:
1 acid-resistant container (Type I)
Stirring rod (glass, ceramic, or wood)

Procedure:

1. Pour all materials into the container and stir well

WARNING: The fumes from this explosive are poisonous.

2. Store in an airtight container.

DDNP

Also called: Diazodinitrophenol
Explosive type: high—primary
Det. rate: 6500 m/s
Lead block test: 325 cc
Chem. formula: C6H2N4O5
Form: dark red OR brown powder
Deflagration temp.: 180°C (356°F)
Impact sensitivity: very high—1.5 Nm
Friction sensitivity: extremely high—e.n.u.
Water sensitivity: moderate
Initiate with: spark

DDNP is one of the most effective primary explosives. However, in order for it to be detonated by a spark, it must be contained to some degree. A heavy paper tube is adequate for this purpose. A VERY hot spark will also overcome this limitation. Prolonged exposure of this material to strong sunlight will darken the color of the crystals and slightly reduce performance.

MANUFACTURE:

Chemicals required:
Picric acid/3 u.b.w
Sulfur (powdered)/2.5 u.b.w.
Sodium hydroxide/3 u.b.w.
Potassium nitrate/1.8 u.b.w OR
Sodium nitrate/1.8 u.b.w.
Sulfuric acid/2.5 u.b.w.
Water

Other materials required.
1 heat/acid resistant container (Type III)
3 acid-resistant containers (Type I)

Stirring rod (glass or ceramic)
Filter paper
Heat source

Procedure:

1. Pour 30 u.b.w. of warm water into the first acid-resistant container.

2. Stir 0.5 u.b.w. of sodium hydroxide into the water in the first container.

3. Stir 3 u.b.w. of picric acid into the water/sodium hydroxide mixture. Set this mixture aside.

4. Pour 1 u.b.w. of water into the heat/acid-resistant container.

5. Stir 2.5 u.b.w. of powdered sulfur and 2.5 u.b.w of sodium hydroxide into the water in the heat/acid-resistant container. Stir this mixture for one minute.

6. Place the water/sulfur/sodium hydroxide mixture on the heat source. GENTLY heat the mixture until it turns a dark red color. Remove the mixture from heat and allow it to cool to room temperature.

7. Slowly stir the red water/sulfur/sodium hydroxide mixture into the water/picric acid /sodium hydroxide mixture from step 3. Let this new mixture stand for 30 minutes, stirring every 5 minutes.

8. Filter this mixture through filter paper. Reddish crystals will collect on the paper. Keep the crystals and discard the liquid.

9. Thoroughly wash and dry the heat/acid-resistant container.

10. Pour 60 u.b.w. of water into the heat/acid-resistant container and heat to a low boil. Turn off heat.

11. Dissolve the red crystals from step 8 in the boiling water.

12. Filter this mixture through filter paper. This time, keep the liquid and discard the material that collects on the filter paper. The liquid should now be in the second acid-resistant container.

13. Pour 6 u.b.w. of water into the third acid resistant container. Slowly stir 3 u.b.w. of sulfuric acid into the water. This water/acid mixture will be referred to as diluted sulfuric acid.

14. Stir ONE DROP at a time of the diluted sulfuric acid into the liquid in the second acid-resistant container (from step 12) until the liquid turns an orange-brown color. Be sure to add the acid one drop at a time so only the minimum amount necessary to change the liquid's color is used. Let this mixture stand for 5 minutes.

15. Stir in an additional 2.5 u.b.w. of diluted sulfuric acid into the above mixture. Let this mixture stand for 30 minutes.

16. Thoroughly wash and dry the first acid-resistant container.

17. Pour 80 u.b.w. of water into the first acid-resistant container. Stir 1.75 u.b.w of potassium nitrate into the water. Stir until the potassium nitrate is dissolved.

18. Stir the potassium nitrate/water mixture into the mixture from step 15. NOTE: The crystals that settle out of this new mixture are DDNP. Handle with care.

19. Filter the DDNP out of the mixture using filter paper.

20. The DDNP must now be dried. Two methods are listed below.

A) The DDNP can be dried using a hot water bath. Place a small amount of material in the bottom of an acid-resistant container (Type I). Fill a pan with hot (90°C/194°F) water and then place the container in the pan. Refill the pan with hot water as it cools.

B) The DDNP can be dried using an oven. First preheat the oven to 100°C (212°F). Then turn the oven off and wait 10 minutes. Place a small amount of DDNP in the bottom of a large acid-resistant container. Place the container into the oven. Let the material sit in the oven until either it is completely dry or the oven cools below 50°C (122°F). If the oven

has cooled but the material is not dry, take the DDNP out of the oven and reheat the oven to 100°C (212°F). Again, turn the oven off and wait 10 minutes before placing the material back in the oven. Repeat this process until the material is dry. When using this method, it is a good idea to double-check the oven temperature with a second thermometer—if the oven is too hot, the material may explode.

If you use some other method, be sure to dry the material in small batches of about 14g (0.5oz) so if it should ignite accidentally, the damage will be minimized. Also, do not dry this material in direct sunlight.

DITHEKITE

Also called: Hellhoffite
Explosive type: high—secondary
Det. rate: e.n.u.
Lead block test: e.n.u.
Chem. formula: mixture of nitrobenzene and nitric acid
Form: yellow liquid
Deflagration temp.: e.n.u.
Impact sensitivity: e.n.u.
Friction sensitivity: e.n.u.
Water sensitivity: low
Initiate with: blasting cap

There is not much specific information readily available on this explosive because it fell out of general use some time ago. It is, however, an effective explosive that it is not overly sensitive to shock or impact. Still, like all explosives, it must be handled very gently.

There are several points that must be remembered when using this explosive. First, the fumes from both the chemical ingredients and the explosive itself are toxic, so avoid inhaling them. Second, this explosive is chemically unstable, so it should not be stored for more then 24 hours; after that, it should be discarded in a safe area. Third, because the explosive is so easy to manufacture, the ingredients may be carried separately and mixed on location. Lastly, because this material is very acidic, the blasting cap and lead wires should be coated with wax or an epoxy paint to protect them.

MANUFACTURE:

Chemicals required:
N tric acid (90%)/3 u.b.w.—2 p.b.v.
N trobenzene/1.2 u.b.w.—1 p.b.v.

Other materials required:
Acid-resistant container (Type I)
Stirring rod (glass or ceramic)

Procedure:
1. Slowly pour the nitric acid and the nitrobenzene into the glass container and stir well.
2. Store in an acid-resistant container.

HMTD

Also called: Hexamethylenetriperoxide diamine
Explosive type: high—primary
Det. rate: 4500 m/s
Lead block test: 330cc
Chem. formula: C6H12NO6
Form: colorless crystals
Deflagration temp.: 200°C (392°F)
Impact sensitivity: extremely high—0.6 Nm
Friction sensitivity: extremely high—0.1 kp
Water sensitivity: moderate
Initiate with: spark

HMTD is an effective initiating explosive. However, HMTD has very poor thermal stability. If exposed to temperatures around 60°C (140°F), the material loses effectiveness in about two weeks. If exposed to temperatures around 75°C (167°F), the material loses effectiveness in under one week. Temperatures around 90°C (194°F) destroy the material in a matter of hours. Therefore, it is not recommended that HMTD be stored for long periods of time before use.

MANUFACTURE:

Chemicals required:
- Hexamethylenetetramine/1 u.b.w.
- Hydrogen peroxide (10% solution)/5.25 u.b.w.
- Citric acid/2 u.b.w.

Other materials required:
- 2 acid-resistant containers (Type I)
- Stirring rod (glass or ceramic)
- Large pan
- Glass thermometer
- Filter paper

Procedure:

1. Pour the hydrogen peroxide solution into the acid-resistant container.
2. Fill the pan with a mixture of ice and water. Place the container of hydrogen peroxide into the pan.
3. Stir the hexamethylenetetramine in the hydrogen peroxide.
4. Allow the mixture to stand in the ice bath until it cools to below 5°C (41°F).
5. Slowly stir the citric acid into the mixture.
6. Remove the mixture from the cooling bath and allow the mixture to stand for 24 hours. Crystals of HMTD will settle out of this mixture.
7. Filter the HMTD crystals out of the mixture using the filter paper.
8. Pour 10 u.b.w. of cold water over the crystals to wash away impurities.
9. Allow the material to air dry.

KINEPAK

Explosive type: high—secondary
Det. rate: e.n.u.
Lead block test: approx. 500cc
Chem. formula: mixture of AN and nitromethane
Form: damp white powder
Deflagration temp.: e.n.u.
Impact sensitivity: moderate—e.n.u.
Friction sensitivity: e.n.u.
Water sensitivity: moderate
Initiate with: blasting cap

If you are using this explosive to make a shaped charge, combine the component materials directly in the charge container. This will prevent the explosive from becoming tightly packed. When this explosive becomes tightly packed, it becomes difficult to detonate. Using a 28g (1oz) booster charge will assure detonation even if the material has become compacted.

MANUFACTURE:

Chemicals required:
Ammonium nitrate (powdered)/5 u.b.w.
Nitromethane/2 u.b.w.

Other materials required:
1 container (heat- OR acid-resistant)

Procedure:
1. Place the ammonium nitrate into the container.
2. Gently pour the nitromethane over the ammonium nitrate. NOTE: Do not mix or stir the mixture. This will compact the mixture and make it difficult to detonate.
3. Allow the mixture to stand for 10 minutes.
4. The explosive is now ready for use.

LEAD AZIDE

Explosive type: high—primary
Det. rate: 4600 m/s
Lead block test: 112cc
Chem. formula: Pb(N3)2
Form: colorless crystals
Deflagration temp.: 320°C (600°F)
Impact sensitivity: high—4Nm
Friction sensitivity: extremely high—0.1 kp
Water sensitivity: low
Initiate with: spark

Lead azide is an excellent primary explosive. It is, however, somewhat difficult to detonate, so a very hot spark should be used to initiate it. Like all primary explosives, this material must be handled with extreme care. Additionally, lead azide reacts dangerously with copper, bronze, brass, and lead.

MANUFACTURE:

Chemicals required:
Lead nitrate/2 u.b.w.
Sodium azide/1 u.b.w.
Dextrin/0.05 u.b.w.
Sodium hydroxide/0.05 u.b.w.
Water

Other materials required:
1 acid-resistant container (Type I)
1 heat/acid-resistant container (Type III)
Filter paper
Glass thermometer

Procedure:
1. Pour 24 u.b.w. of water into the heat/acid-resistant

container and heat the water to 75°C (167°F). Turn off the heat source.

2. Stir the lead nitrate into the hot water.

3. Stir the sodium hydroxide into the water/lead nitrate mixture.

4. Stir the dextrin into the water/lead nitrate/sodium hydroxide mixture. Set this mixture aside.

5. Pour 12 u.b.w. of warm water into the acid-resistant container.

6. Stir the sodium azide into the warm water in the acid-resistant container.

7. Using LOW HEAT, slowly heat the water/lead nitrate/sodium hydroxide mixture from step 4 to 70°C (158°F). Stir this mixture while it is heating. When the mixture reaches 70°C (158°F), remove it from the heat source.

8. Slowly STIR the sodium azide/water mixture into the mixture in the heat/acid-resistant container. Whitish crystals will settle out of this new mixture. These crystals are lead azide.

9. Allow the mixture to stand for 30 minutes.

10. Using the filter paper, filter the lead azide out of the mixture.

11. Slowly pour 12 u.b.w. of water over the crystals to wash away impurities.

12. The lead azide must now be dried. Two methods are listed below.

A) The material can be dried using the sun. Spread the lead azide out on a large flat surface and leave in direct sunlight for several hours. This will only work if the air temperature is over 25°C (77°F).

B) The material can be dried using a hot water bath. Place a small amount of material in the bottom of an acid-resistant container (Type I). Fill a pan with hot (90°C/194°F) water and then place the container in the pan. Refill the pan with hot water as it cools.

LEAD PICRATE

Explosive type: high—primary
Det. rate: e.n.u.
Lead block test: e.n.u.
Chem. formula: Pb(C6H2N3O7)2.H20
Form: yellow needles
Deflagration temp.: approx. 330°C (626°F)
Impact sensitivity: extremely high—e.n.u.
Friction sensitivity: extremely high—e.n.u.
Water sensitivity: moderate
Initiate with: spark

There is little information readily available on lead picrate. However, it is a workable primary explosive. This material is not very powerful and should always be used with a booster charge of an easily detonated secondary explosive. Like all primary explosives, this material is very sensitive to impact, friction, and sparks.

MANUFACTURE:

Chemicals required:
- Picric acid/1 u.b.w.
- Lead monoxide/1 u.b.w.
- Methyl alcohol/8 u.b.w
- Water

Other materials required:
- 1 acid-resistant container (Type I)
- Large pan
- Heat source
- Stirring rod (glass OR ceramic)

Procedure:

1. Pour the alcohol into the acid resistant container.

2 Stir the picric acid into the alcohol.

3 Stir the lead monoxide into the alcohol/picric acid mixture. WARNING: This solution is a primary explosive.

4. Stir this material until the alcohol evaporates to the point that the mixture starts to thicken.

5. VERY GENTLY continue to stir the mixture to prevent the material from forming large lumps. NOTE: You probably will not be able to prevent all lumps from forming.

6. Dry the material using a hot water bath. Place the lead picrate in an acid-resistant container and set the container in a pan of hot (90°C/194°F) water. WARNING: This material is a primary explosive—it must be handled very gently.

LEAD STYPHNATE

Also called: lead trinitroresorcinate
Explosive type: high—secondary
Det. rate: 5200 m/s
Lead block test: 130cc
Chem. formula: $C_6H_3N_3O_9Pb$
Form: orange to brown crystals
Deflagration temp.: 275C (527F)
Impact sensitivity: moderately high—5 Nm
Friction sensitivity: e.n.u.
Water sensitivity: moderate
Initiate with: spark

Lead styphnate is a fairly weak primary explosive. This material must always be used with a sensitive booster charge. The main advantage of this material that it is very easy to detonate with a spark. A thin layer of lead styphnate is often used as an initiator for lead azide. The ease with which this material may be detonated makes it quite sensitive to static electricity discharge.

MANUFACTURE:

Chemicals required:
- Magnesium oxide/1 u.b.w.
- Trinitroresorcinol/6 u.b.w.
- Lead nitrate solution (34%) (s.g. 1.274)/1 u.b.w.
- Water

Other materials required:
- Acid resistant container (Type I)
- Heat/acid-resistant container (Type III)
- Heat source
- Large pan
- Glass thermometer

Stirring rod (glass or ceramic)
Filter paper

Procedure:

1. Pour 17.5 u.b.w. of water into the heat/acid-resistant container.

2. Stir the trinitroresorcinol into the water.

3. Slowly stir the magnesium oxide into the water/trinitroresorcinol mixture. This will cause the temperature of the mixture to rise.

4. Fill the pan with water and place it on the heat source.

5. Place the heat/acid-resistant container into the pan.

6. Using low heat, warm the water/trinitroresorcinol/magnesium oxide mixture to 60°C (140°F).

7. Remove the heat/acid-resistant container from the pan of water and allow the mixture to cool to room temperature.

8. Filter the liquid in the heat/acid-resistant container through filter paper to remove any solids. Place this filtered liquid into the acid-resistant container.

9. This is the tricky part. Using water, dilute the solution in the acid-resistant container until it has a density of 1.043g per ml. If you're not familiar enough with chemical procedures to do this, then find someone with a background in chemistry to explain how this is done.

10. Allow this diluted solution to stand for 12 hours. This liquid is now a diluted magnesium styphnate solution.

11. Thoroughly wash and dry the heat/acid-resistant container.

12. Place 3.1 u.b.w. of the diluted magnesium styphnate solution into the heat/acid-resistant container. Save the remainder of this solution so that on the next batch you can start right from this step instead of having to manufacture more of the magnesium styphnate solution.

13. Fill the large pan with water and place it on the heat source.

14. Place the heat/acid-resistant container of magnesium styphnate solution into the pan of water.

15. Slowly heat the magnesium styphnate solution to 55°C (131°F), then turn off the heat source.

16. Remove the container of magnesium styphnate solution from the hot water.

17. Very SLOWLY (one drop at a time) stir 1 u.b.w. of lead nitrate solution into the magnesium styphnate solution. Watch the temperature of this new mixture; if it begins to approach 60°C (140°F), then stop adding the lead nitrate solution and continue stirring until the temperature drops to 55°C (131°F).

18. Once the last of the lead nitrate solution has been added, fill the large pan with ice and water.

19. Place the container with the lead nitrate/magnesium styphnate mixture into the pan of ice water. Very GENTLY stir the mixture of lead nitrate/magnesium styphnate until it cools to 25°C (77°F). WARNING: This mixture now contains a primary explosive.

20. Stop stirring and allow the mixture to stand in the ice bath for 20 minutes. Crystals of lead styphnate will settle to the bottom of the container.

21. Gently filter the lead styphnate out of the solution using the filter paper.

22. Slowly pour 5 u.b.w. of water over the lead styphnate to wash away impurities.

23. The lead styphnate must now be dried. This can be done several different ways. Three methods are listed below.

A) The material can be dried using the sun. Spread the lead styphnate out on a large flat surface and leave in direct sunlight for several hours. This will only work if the air temperature is over 25°C (77°F).

B) The material can be dried using a hot water bath. Place a small amount of material in the bottom of an acid resistant container (Type I). Fill a pan with hot (90°C/194°F) water and then place the container in the pan. Refill the pan

C) The lead styphnate can be dried using an oven. First preheat the oven to 100°C (212°F). Then turn the oven off and wait 10 minutes. Place a small amount of lead styphnate in the bottom of a large acid-resistant container. Place the container into the oven. Let the material sit in the oven until either it is completely dry or the oven cools below 50°C (122°F). If the oven has cooled but the material is not dry, take the lead styphnate out of the oven and reheat the oven to 100°C (212°F). Again, turn the oven off and wait 10 minutes before placing the material back in the oven. Repeat this process until the material is dry. When using this method, it is a good idea to double-check the oven temperature with a second thermometer—if the oven is too hot, the material may explode.

If you use some other method, be sure to dry the material in small batches of about 14g (0.5oz) so if it should detonate accidentally, the damage will be minimized.

MERCURY FULMINATE

Explosive type: high—primary
Det. rate: 4000 m/s
Lead block test: e.n.u.
Chem. formula: C2N2O2Hg
Form: white or gray crystals
Deflagration temp.: 165°C (330°F)
Impact sensitivity: very high—1.5 Nm
Friction sensitivity: extremely high—e.n.u.
Water sensitivity: low
Initiate with: spark

Mercury fulminate is a moderately powered primary explosive. A 2gm charge will effectively induce detonation in most materials. However, for use in detonating less sensitive explosives, a booster charge of a sensitive explosive (like tetryl or PETN) should be used. In order to stretch available materials, up to 25% by weight potassium chlorate may be added to mercury fulminate with no noticeable loss in power. This material loses its effectiveness if stored at temperatures above 50°C (122°F) for prolonged periods of time. This would take several months at 50°C (122°F) but only a few days at 85°C+ (185°F+). Although this material is relatively safe to handle when wet, it becomes very sensitive when dry. If practical, it should be stored slightly wet.

MANUFACTURE:

Chemicals required:

Nitric acid (90%)/60 u.b.w.—40 p.b.v.
Mercury/11.5 u.b.w.—1 p.b.v.
Ethyl alcohol/110 u.b.w.—140 p.b.v.
Water/20 u.b.w.—20 p.b.v

Other materials required:
2 acid-resistant containers (Type I)
Filter paper
Glass or ceramic stirring rod

Procedure:

1. Pour 20 u.b.w. of water into the acid-resistant container.

2. Slowly stir the nitric acid into the water.

3. Slowly stir the mercury into the acid/water mix. NOTE: Within about 10 minutes, this mixture should start to produce reddish fumes. If not, add ONE drop of water every 30 seconds until it does. WARNING: These fumes are poisonous. Be sure to have adequate ventilation.

4. Pour 63 u.b.w.—80 p.b.v of the ethyl alcohol into the second acid-resistant container.

5. Slowly stir the acid/mercury mixture into the ethyl alcohol.

6. Let the alcohol/acid/mercury mixture stand for 1 hour. NOTE: After about 5 to 15 minutes, the temperature of the mixture will start to rise and heavy white fumes will boil out of the mixture. Also, after several minutes the fumes may take on a slightly red color. WARNING: These fumes are poisonous. Be sure to have adequate ventilation.

7. Once the reaction has stopped, let the mixture stand for 15 minutes. The crystals that settle out of the mixture are mercury fulminate. Filter this mixture through filter paper to recover the crystals.

8. Slowly pour 47 u.b.w—60 p.b.v. of ethyl alcohol over the crystals to wash away the remaining impurities.

9. Dry the material using a hot water bath. Place the mercury in an acid-resistant container, then set the container in a pan of hot (90°C/194°F) water. WARNING: This material is a primary explosive. It must be handled very gently.

10. Store in a nonmetal container.

METHYL NITRATE

Explosive type: high—secondary
Det. rate: 6500 m/s
Lead block test: 600cc
Chem. formula: CH3ONO2
Form: clear liquid
Deflagration temp.: 150°C (302°F)
Impact sensitivity: extremely high—0.2 Nm
Friction sensitivity: low—36+ kp
Water sensitivity: low
Initiate with: blasting cap, squib (if tightly contained)

Methyl nitrate is a very sensitive explosive, so it must be handled with extreme care. Because this material evaporates quickly, it must be stored in an airtight container. This explosive may be used as liquid, but it is more often used by wetting an absorbent (fine sawdust) with it and then using the absorbent as an explosive. This makes handling the material much safer.

MANUFACTURE:

Chemicals required:
Sulfuric acid/44 u.b.w.—24 p.b.v.
Nitric acid (90%)/24 u.b.w.—16.5 p.b.v.
Methyl alcohol/10.5 u.b.w—13.5 p.b.v.
Water

Other materials required:
2 acid-resistant containers (Type I)
Glass stirring rod
Glass thermometer
Method of cooling (ice water bath, freezer, snow, etc.)
Eyedropper OR
Syringe OR

Turkey baster
Absorbent (fine sawdust, strips of paper, strips of cloth)
Tray (glass, plastic or metal)

Procedure:

1. Using a freezer, a large pan filled with water and ice, or similar method, cool the chemicals to 0°C (32°F).

2. Gently stir the nitric acid into the sulfuric acid in one of the glass containers.

3. Let the mixed acid sit in a freezer or a large pan of ice water until the temperature drops to 5°C (41°F).

4. While continuing to cool the mixed acids, very slowly (one drop every 30 seconds) STIR in the methyl alcohol. If the temperature starts to approach 18°C (64°F), then stop adding methyl alcohol (but continue stirring) and allow the mixture to cool to 5°C (41°F).

5. Allow the mixture to stand for 10 minutes. The mixture will separate into two layers. The top layer is unpurified methyl nitrate.

6. Using an eyedropper, syringe, turkey baster, or similar suction device, VERY GENTLY remove the top layer of liquid (the explosive) from the first container and place it into the second acid-resistant container. WARNING: Do not attempt to pour the explosive into the second container; that might cause the explosive to detonate.

7. Very GENTLY add 25 u.b.w.—25 p.b.v. of water to the methyl nitrate in the second acid-resistant container.

8. Very GENTLY but thoroughly stir the water/methyl nitrate mixture.

9. Allow the mixture to stand until it separates into two layers. This time, the explosive is the bottom layer.

10. Very gently remove and discard the top layer (water) using the suction device.

11. Repeat steps 7 though 10.

12. The methyl nitrate is now ready for use. If you are processing it into methyl nitrate dynamite, then proceed to step 13, otherwise, store the methyl nitrate in an airtight container.

13. Place some of the absorbent into the tray.

14. Using the suction device, slowly and gently mix the explosive into the absorbent. The absorbent should be damp, but not so wet that the absorbent could drip. If the mixture becomes too wet, add more of the absorbent. If it is too dry, add more explosive. If in doubt as to whether or not the material is too damp, add more absorbent. It is much safer to make the explosive too dry rather than too wet.

15. Store the explosive in an airtight container.

NITROCELLULOSE

Explosive type: high—secondary
Det. rate: 6500 m/s
Lead block test: 300 cc
Chem. formula: C12H14N6O22 (ideal)
Form: solid—form will depend on materials used
Deflagration temp.: 160°C (320°F)
Impact sensitivity: very high—3 Nm
Friction sensitivity: low—36+ kp
Water sensitivity: low
Initiate with: blasting cap

Nitrocellulose is a very good explosive to use as a booster charge, as it is fairly easy to initiate and will reliably detonate almost any secondary explosive. This material is very spark sensitive when dry.

MANUFACTURE:

Chemicals required:
- Sulfuric acid/3 u.b.w.
- Nitric acid (90%)/1 u.b.w.
- Clean white 100% cotton cloth OR
  - Unsized unprinted white paper (paper towels) OR cotton balls
- Sodium carbonate/.05 u.b.w.
- Water

Other materials required:
- 2 acid-resistant containers (Type I)
- Heat-resistant container (Type II)
- Heat source
- Stirring rod (glass or wood)
- Clean white 100% cotton cloth at least 12x12 inch

Procedure:

1. If possible, put all materials in a freezer or refrigerator for several hours to cool them.

2. Stir the nitric acid into the sulfuric acid in the first acid-resistant container. If sulfuric acid is not available, it is possible to simply use the nitric acid by itself, but the quality of the product will suffer as a result. Allow this mixture to stand for 1 hour in an ice bath or refrigerator.

3. Put the cotton (or paper) into the second acid-resistant container.

4. Pour the acid mixture over the cotton until it is thoroughly soaked.

5. Let the mixture stand for 12 hours in a COOL place. A refrigerator is ideal; if one is not available, the container may be set in a large container of ice water. WARNING: Do NOT allow any water from the ice bath into the container holding the explosive, as small amounts of water may raise the temperature of the mixture and could cause the mixture to explode.

6. RAPIDLY pour 12 u.b.w. of COLD water into the mixture and stir gently. This will not raise the temperature of the mixture because the amount of water is large. The warning in step 5 only applies to small drops of water.

7. Stir for 10 minutes.

8. Strain the mixture through a piece of cotton cloth and discard the liquid.

9. Place the solids in the heat-resistant container.

10. Pour enough water into the heat-resistant container to completely cover the strained material.

11. Place the container on the heat source and gently simmer for 30 minutes. Stir this mixture every five minutes.

12. Strain the mixture through a piece of cotton cloth and discard liquid.

13. Wrap cloth around the material and gently squeeze out excess liquid.

14. Repeat steps 9 through 12 four more times. Add sodium carbonate to the second to last change of water before simmering

15. The nitrocellulose must now be dried. This can be done several different ways. Three methods are listed below.

A) The material can be dried using the sun. Spread the nitrocellulose out on a large flat surface and leave in direct sunlight for several hours. This will only work if the air temperature is over 25°C (77°F).

B) The material can be dried using a hot water bath. Place a small amount of material in the bottom of an acid resistant container (Type I). Fill a pan with hot (90°C/194°F) water and then place the container in the pan. Refill the pan with hot water as it cools.

C) The nitrocellulose can be dried using an oven. First preheat the oven to 100°C (212°F). Then turn the oven off and wait 10 minutes. Place a small amount of nitrocellulose in the bottom of a large acid-resistant container. Place the container into the oven. Let the material sit in the oven until either it is completely dry or the oven cools below 50°C (122°F). If the oven has cooled but the material is not dry, take the nitrocellulose out of the oven and reheat the oven to 100°C (212°F). Again, turn the oven off and wait 10 minutes before placing the material back in the oven. Repeat this process until the material is dry. When using this method, it is a good idea to double-check the oven temperature with a second thermometer—if the oven is too hot, the material may explode.

If you use some other method, be sure to dry the material in small batches of about 14g (0.5oz) so if it should ignite accidentally, the damage will be minimized.

FOR ACADEMIC STUDY ONLY

NITROGLYCERIN

Explosive type: high—secondary
Det. rate: 7500 m/s
Lead block test: 520cc
Chem. formula: $C_3H_5N_3O_9$
Form: thick yellow liquid
Deflagration temp.: approx. 145°C (293°F)
Impact sensitivity: extremely high—0.2 Nm
Friction sensitivity: low—36+ kp
Water sensitivity: none
Initiate with: blasting cap

Nitroglycerin is a very sensitive explosive that must be handled with extreme care. This explosive may be used as liquid, but it is more often used by wetting an absorbent (fine sawdust) with it and then using the absorbent as an explosive. This makes handling the material much safer. Nitroglycerin freezes at 13°C (55°F). The freezing of nitroglycerin is not in and of itself dangerous; however, while the nitroglycerin is thawing, it is even more sensitive than while in liquid form. Frozen or thawing nitroglycerin SHOULD NOT BE HANDLED IN ANY WAY.

MANUFACTURE:

Chemicals required:
- Glycerin/1 u.b.w.—.79 p.b.v.
- Sulfuric acid/5 u.b.w.—2.78 p.b.v.
- Nitric acid (90%)/3 u.b.w.—2 p.b.v.
- Sodium bicarbonate (optional)—0.05 u.b.w.-0.1 p.b.v.
- Water

Other materials required:
- 2 acid resistant containers (Type I) w/ pouring spouts
- Large container (any type) big enough to hold 50 p.b.v.

Stirring rod (glass)
Glass thermometer
Tray
Absorbent (fine sawdust)
Suction device (eyedropper, syringe, bulb baster, etc.)

Procedure:

1. Gently pour the sulfuric acid into the first acid-resistant container. Slowly stir the nitric acid into the sulfuric acid.

2. Allow the acid mixture to stand for 1 hour.

3. Using a refrigerator, a freezer, or a large pan filled with water and ice, cool the acid mixture to 16°C (60°F).

4. While continuing to cool the acid mixture, very slowly (one drop every 30 seconds) STIR the glycerin into the acid mixture. If the temperature of the acid/glycerin mixture starts to approach 26°C (78°F), then stop adding glycerin (but continue stirring) and allow the mixture to cool to 18°C (64°F) before continuing. WARNING: If you are using an ice water bath for cooling, be very careful to avoid getting ANY water into the acid/glycerin mixture. This could cause the temperature to rise dangerously. Also, if at any time the mixture starts to emit dense red fumes, immediately dump it into the large container filled with water. This will prevent an explosion. During this step, the glycerin is converted into nitroglycerin.

5. Continue stirring mixture for 5 minutes after the last of the glycerin has been added.

6. Pour 10 u.b.w. of water into the second acid-resistant container and 40 u.b.w. of water into the large container.

7. Cool the water in the second acid-resistant container to 16°C (60°F).

8. While continuing to cool the water, very SLOWLY and GENTLY stir the acid/nitroglycerin mixture from the first container into the water. The temperature of this new mixture must be watched very carefully. If the temperature of this new mixture starts to approach 26°C (78°F), then stop adding the

acid/nitroglycerin (but continue stirring) and allow the mixture to cool to 18°C (64°F) before continuing.

9. Continue stirring this mixture and watching the temperature for 5 minutes after the last of the glycerin has been added.

10. Remove from cooling and allow this mixture to stand until it separates into two layers. The bottom layer is the explosive.

11. Very gently pour off the top layer. Be very careful not to pour out any of the bottom layer. It is MUCH better to not quite pour off all of the top layer than risk pouring off any of the explosive.

12. Very GENTLY stir 10 u.b.w. of water into the nitroglycerin. It is not necessary to monitor the temperature of the mixture this time, as it will not rise.

13. Gently stir this mixture for 5 minutes.

14. Allow the mixture to stand until it separates into two layers. The explosive is the bottom layer.

15. Very GENTLY pour off the top layer.

16. Repeat steps 12 through 15 at least two more times, adding the sodium bicarbonate (if available) during step 13 on the second to last change of water.

17. The nitroglycerin is now ready for use. If you are making nitroglycerin dynamite, then proceed to step 18; otherwise, store the nitroglycerin in a suitable container.

18. Place some of the absorbent into the tray.

19. Using the suction device, very SLOWLY and GENTLY add the nitroglycerin to the absorbent. Gently mix the explosive and the absorbent with a wooden stirring rod. The absorbent should be slightly damp, but not so wet that the absorbent could drip. If the mixture becomes too wet, add more of the absorbent. If it is too dry, add more explosive. NOTE: It is much safer to make the explosive a little too dry rather then a little too wet.

NITROGLYCOL

Explosive type: high—secondary
Det. rate: 7300 m/s
Lead block test: 620cc
Chem. formula: $C_2H_4N_2O_6$
Form: colorless liquid
Deflagration temp.: 215°C (419°F)
Impact sensitivity: extremely high—0.2 Nm
Friction sensitivity: low—36+ kp
Water sensitivity: none
Initiate with: blasting cap

Nitroglycol is a very powerful and sensitive explosive that must be handled with extreme care. This explosive may be used as liquid, but it is more often used by wetting an absorbent (fine sawdust) with it and then using the absorbent as an explosive. This makes handling the material much safer. Nitroglycol freezes at -20°C (-4°F). As with nitroglycerin, the freezing of the material is not in and of itself dangerous. However, while the nitroglycol is thawing, it is even more sensitive than while in liquid form. Thawing nitroglycol SHOULD NOT BE HANDLED IN ANY WAY. Nitroglycol can be mixed with nitroglycerin to lower the freezing point of the latter.

MANUFACTURE:

Chemicals required:

Glycol/1 u.b.w.—.9 p.b.v.
Sulfuric acid/5 u.b.w.—2.78 p.b.v.
Nitric acid (90%)/3 u.b.w.—2 p.b.v.
Sodium bicarbonate (optional)—0.05 u.b.w.
Water

Other materials required

2 acid-resistant containers (Type I) w/ pouring spouts
Large container (any type) big enough to hold 50 p.b.v.
Stirring rod (glass)
Glass thermometer
Tray
Absorbent (fine sawdust)
Suction device (eyedropper, syringe, bulb baster, etc.)

Procedure:

1. Gently pour the sulfuric acid into the first acid-resistant container. Slowly stir the nitric acid into the sulfuric acid.

2. Allow the acid mixture to stand for 10 minutes.

3. Using a refrigerator, a freezer, or a large pan filled with water and ice, cool the acid mixture to 16°C (60°F).

4. While continuing to cool the acid mixture, very slowly (one drop every 30 seconds) STIR the glycol into the acid mixture. If the temperature of the acid/glycol mixture starts to approach 26°C (78°F), then stop adding glycol (but continue stirring) and allow the mixture to cool to 18°C (64°F) before continuing. WARNING: If you are using an ice water bath for cooling, be very careful to avoid getting ANY water into the acid/glycol mixture. This could cause the temperature to rise dangerously. Also, if at any time the mixture starts to emit dense red fumes, immediately dump it into the large container filled with water. This will prevent an explosion. During this step, the glycol is converted into nitroglycol.

5. Continue stirring mixture for 5 minutes after the last of the glycol has been added.

6. Pour 10 u.b.w. of water into the second acid-resistant container and 40 u.b.w. of water into the large container.

7. Cool the water in the second acid-resistant container to 16°C (60°F).

8. While continuing to cool the water, very SLOWLY and GENTLY stir the acid/nitroglycol mixture from the first container into the water. The temperature of this new mixture must be watched very carefully. If the temperature of this new

mixture starts to approach 26°C (78°F), then stop adding the acid/nitroglycol (but continue stirring) and allow the mixture to cool to 18°C (64°F) before continuing.

9. Continue stirring this mixture and watching the temperature for 5 minutes after the last of the glycol has been added.

10. Remove from cooling and allow this mixture to stand until it separates into two layers. The bottom layer is the explosive.

11. Very GENTLY pour off the top layer. Be very careful not to pour out any of the bottom layer. It is MUCH better to not quite pour off all of the top layer than risk pouring off any of the explosive.

12. Very GENTLY stir 10 u.b.w. of cool water into the nitroglycol. It is not necessary to monitor the temperature of the mixture this time; it will not rise.

13. Gently stir this mixture for 5 minutes.

14. Allow the mixture to stand until it separates into two layers. The explosive is the bottom layer.

15. Very GENTLY pour off the top layer.

16. Repeat steps 12 through 15 at least two more times, adding the sodium bicarbonate (if available) during step 13 on the second to last change of water.

17. The nitroglycol is now ready for use. If you are making nitroglycol dynamite, then proceed to step 18; otherwise, store the nitroglycol in a suitable container.

18. Place some of the absorbent into the tray.

19. Using the suction device, very SLOWLY and GENTLY add the nitroglycol to the absorbent. Gently mix the explosive and the absorbent with a wooden stirring rod. The absorbent should be slightly damp, but not so wet that the absorbent could drip. If the mixture becomes too wet, add more of the absorbent. If it is too dry, add more explosive. NOTE: It is much safer to make the explosive a little too dry rather than a little too wet.

FOR ACADEMIC STUDY ONLY

NITROSTARCH

Explosive type: high—secondary
Det. rate: 5800 m/s
Lead block test: 350cc
Chem. formula: $C_6H_7N_3O_9$
Form: light yellow powder
Deflagration temp.: 182°C (360°F)
Impact sensitivity: moderately low—11 Nm
Friction sensitivity: e.n.u.
Water sensitivity: moderate
Initiate with: blasting cap

Nitrostarch is very similar to nitrocellulose, although it is slightly less powerful and a little more difficult to initiate. It is reasonably effective as a booster charge. Like nitrocellulose, it is highly spark sensitive and burns violently if ignited.

MANUFACTURE:

Chemicals required:
- Sulfuric acid/3 u.b.w.
- Nitric acid (90%)/1.5 u.b.w.
- Starch/.25 u.b.w.
- Ammonium hydroxide (3% solution)/0.1 u.b.w.
- Water

Other materials required:
- 2 acid-resistant containers (Type I,
- Stirring rod (glass or ceramic)
- Glass thermometer
- Large pan
- Filter paper

Procedure:

1. Pour the sulfuric acid into the acid-resistant container

2. Slowly stir the nitric acid into the sulfuric acid.

3. Place the acid mixture into an ice water bath, refrigerator, or freezer until the temperature of the mixed acid drops to 15°C (59°F).

4. Fill the large pan with ice and water. Place the container of mixed acid into the pan. If you used an ice water bath to cool the mixed acid, then the container of mixed acid is already in an ice water bath.

5. Very SLOWLY (a little at a time) stir the starch into the acid mixture. The temperature of this mixture will start to rise. If the temperature starts to approach 30°C (86°F), continue stirring, but stop adding starch until the temperature drops to 20°C (68°F).

6. After the last of the starch has been added, remove the mixture from the pan of water. Let the mixture stand for 1 hour, stirring every 5 minutes.

7. Pour 6 u.b.w. of cold water into the second acid-resistant container.

8. Slowly stir the mixed acid/starch mixture into the water. Stir this new mixture for 5 minutes.

9. Filter the solid material out of this new mixture using the filter paper. This solid material is nitrostarch.

10. Thoroughly wash and dry the first acid-resistant container.

11. Place the nitrostarch into the acid-resistant container.

12. Pour 3 u.b.w. of warm water into the container with the nitrostarch. Stir this mixture for 5 minutes.

13. Filter the nitrostarch out of the water using the filter paper.

14. Repeat steps 10 through 13 four more times. Add the 0.1 u.b.w. of ammonium hydroxide (3% solution) to the second to last change of water.

15. The nitrostarch must now be dried. This can be done several different ways. Three methods are listed below.

A) The material can be dried using the sun. Spread the nitrostarch out on a large flat surface and leave in direct

sunlight for several hours. This will only work if the air temperature is over 25°C (77°F).

B) The material can be dried using a hot water bath. Place a small amount of material in the bottom of an acid-resistant container (Type I). Fill a pan with hot (90°C/194°F) water and then place the container in the pan. Refill the pan with hot water as it cools.

C) The nitrostarch can be dried using an oven. First, preheat the oven to 100°C (212°F). Then turn the oven off and wait 10 minutes. Place a small amount of nitrostarch in the bottom of a large acid-resistant container. Place the container into the oven. Let the material sit in the oven until either it is completely dry or the oven cools below 50°C (122°F). If the oven has cooled but the material is not dry, take the nitrostarch out of the oven and reheat the oven to 100°C (212°F). Again, turn the oven off and wait 10 minutes before placing the material back in the oven. Repeat this process until the material is dry. When using this method, it is a good idea to double-check the oven temperature with a second thermometer—if the oven is too hot, the material may explode.

If you use some other method, be sure to dry the material in small batches of about 14g (0.5oz) so if it should ignite accidentally, the damage will be minimized.

NLX

Also called: Aerex, PLX
Explosive type: high—secondary
Det. rate: 6200 m/s
Lead block test: 400cc
Chem. formula: information unavailable
Form: clear liquid
Deflagration temp.: e.n.u.—burns easily
Impact sensitivity: low—e.n.u.
Friction sensitivity: low—e.n.u.
Water sensitivity: none
Init'ate with: 28g (1oz) booster

NLX is a powerful liquid explosive. Although it is sometimes possible to detonate this material using a standard blasting cap, performance is greatly reduced. A 28g (1oz) booster charge should always be used with this explosive.

MANUFACTURE:

Chemicals required:
Nitromethane/16 u.b.w.—15 p.b.v.
Aniline/1 u.b.w.—1 p.b.v OR
Triethylamine/1 u.b.w.—1 p.b.v. OR
Ammonia hydroxide (3%+ solution)/
1 u.b.w.—1 p.b.v.

Other materials required:
1 acid-resistant container (Type I)
1 stirring rod (glass, ceramic or wood)

Procedure:
1. Slowly stir the aniline into the nitromethane. If you are using ammonia hydroxide solution as a sensitizer, try to

use at least a 10% solution. If only a 3% solution is available, use a 56g (2oz) booster charge.
2. Store in an acid-resistant container.

NSX

Also called: Nitromethane Sawdust Explosive
Explosive type: high—secondary
Det. rate: approx. 6000 m/s
Lead block test: approx. 350cc
Chem. formula: mixture of nitromethane and fine sawdust
Form: damp powder
Deflagration temp.: e.n.u.
Impact sensitivity: low—e.n.u.
Friction sensitivity: low—e.n.u.
Water sensitivity: moderate
Initiate with: 56gr (2oz) booster

NSX is a fairly powerful explosive. It is also quite simple to manufacture. NSX is quite difficult to detonate and requires a 56gr (2oz) booster charge to initiate it. If possible, this explosive should be manufactured with NLX instead of straight nitromethane. The use of NLX allows this material to be detonated with a 28gr (1oz) booster charge. If it is stored in an airtight container, NSX can be stored for quite some time without losing effectiveness.

MANUFACTURE:

Chemicals required:
Nitromethane/4 u.b.w. OR
NLX/4 u.b.w. (see NLX manufacture)
Fine sawdust/1 u.b.w.

Other materials required:
1 acid resistant container
Stirring rod (glass, ceramic, or wood)

Procedure:
1. Place the sawdust into the acid-resistant container.

2. Slowly stir the nitromethane or NLX into the sawdust. NOTE: The ratio of nitromethane to sawdust is an approximation. Depending on the absorbency of the sawdust, more or less may be used. Use enough sawdust so that the material does not drip.
3. Store in an acid resistant/airtight container.

PETN

Also called Pentaeryhritol tetranitrate
Explosive type: high—secondary
Det. rate: 8400 m/s
Lead block test: 520cc
Chem. formula: C5H5N4012
Form: colorless crystals
Deflagration temp.: 200°C (392°F)
Impact sensitivity: high—3 Nm
Friction sensitivity: moderate—6 kp
Water sensitivity: none
Initiate with: blasting cap

PETN is a powerful explosive with a high detonation rate. It is an excellent booster explosive and is the filling used in most detonation cord.

MANUFACTURE:

Chemicals required:
Nitric acid (98%)/14 u.b.w.
Pentaerythritol/3 u.b.w.
Acetone/18 u.b.w.
Water

Other materials required:
1 large acid-resistant container (Type I)
1 acid-resistant container (Type I)
Large pan
Glass thermometer
Stirring rod (glass or ceramic)
Filter paper OR
Square of cotton cloth

Procedure:

1. Pour the nitric acid into the acid-resistant container and cool the acid to below 15°C (59°F). Any method of cooling may be used for this step; ice water bath, refrigerator, freezer, etc.

2. Fill the large pan with a mixture of ice and water.

3. Place the container of nitric acid into the pan of ice water. Be careful to avoid splashing any water into the container of acid.

4. Very slowly (1/4 teaspoon every 30 seconds) stir the pentaerythritol into the nitric acid. The temperature of the mixture may start to rise. Do not allow the temperature to exceed 20°C (68°F). If the temperature starts to approach 20°C (68°F), then stop adding pentaerythritol and continue to stir gently until the temperature drops below 15°C (59°F).

5. Let the mixture stand in the ice bath for an additional 30 minutes, stirring the mixture every 5 minutes.

6. Fill the large acid-resistant container with 34 u.b.w. of cold water. Gently stir the acid/pentaerythritol mixture into the cold water.

7. Filter the PETN crystals out of the water using a piece of cotton cloth or filter paper.

8. Gently pour another 20 u.b.w. of water over the PETN crystals to wash away remaining acid.

9. Empty out the pan of ice water.

10. Thoroughly wash and dry the acid-resistant container.

11. Pour the acetone into the acid-resistant container.

12. Place the container of acetone into the empty pan.

13. Heat some water to a low boil.

14. Very slowly pour the water into the pan so that the hot water surrounds the container of acetone. If the acid-resistant container is made of glass and you pour the hot water in too fast, the container may break.

15. Allow the temperature of the acetone to rise to about 50°C (122°F). It may be necessary to add more boiling water to the pan in order to keep the water in the pan hot

16. Slowly stir the PETN crystals into the acetone.

17. Empty and rinse the large acid-resistant container. Fill the container with 26 u.b.w. of COLD water.

18. Stir the acetone/PETN mixture into the container of cold water.

19. Filter the PETN crystals out of the water using a clean piece of cotton cloth or filter paper.

20. The PETN must now be dried. This can be done several different ways. Three methods are listed below.

A) The material can be dried using the sun. Spread the PETN out on a large flat surface and leave in direct sunlight for several hours. This will only work if the air temperature is over 25°C (77°F).

B) The material can be dried using a hot water bath. Place a small amount of material in the bottom of an acid-resistant container (Type I). Fill a pan with hot (90°C/194°F) water and then place the container in the pan. Refill the pan with hot water as it cools.

C) The PETN can be dried using an oven. First preheat the oven to 100°C (212°F). Then turn the oven off and wait 10 minutes. Place a small amount of PETN in the bottom of a large acid-resistant container. Place the container into the oven. Let the material sit in the oven until either it is completely dry or the oven cools below 50°C (122°F). If the oven has cooled but the material is not dry, take the PETN out of the oven and reheat the oven to 100°C (212°F). Again, turn the oven off and wait 10 minutes before placing the material back in the oven. Repeat this process until the material is dry. When using this method, it is a good idea to double-check the oven temperature with a second thermometer—if the oven is too hot, the material may explode.

If you use some other method, be sure to dry the material in small batches of about 14g (0.5oz) so if it should ignite accidentally, the damage will be minimized.

PICRIC ACID

Explosive type: high—secondary
Det. rate: 7250 m/s
Lead block test: 315cc
Chem. formula: $C_6H_3N_3O_7$
Form: yellow crystals
Deflagration temp.: 300°C (572°F)
Impact sensitivity: moderate—7.4 Nm
Friction sensitivity: low—36+ kp
Water sensitivity: moderate
Initiate with: blasting cap

Picric acid is a toxic material and must be handled very carefully. Also, picric acid will react with many metals to form impact-sensitive metal salts, so it MUST be kept out of contact with metal.

PREFERRED METHOD OF MANUFACTURE:

Chemicals required:
- Sulfuric acid/12 u.b.w—6.6 p.b.v
- Nitric acid (90%)/3 u.b.w—2 p.b.v
- Phenol/1 u.b.w—0.9 p.b.v
- Water

Other materials required:
- 1 heat/acid-resistant container (Type III)
- 1 acid-resistant container (Type I)
- Large pan
- Heat source
- Glass thermometer

Procedure:

1. Slowly stir 4 u.b.w.—2.2 p.b.v. of sulfuric acid and 1 u.b.w.—0.9 p.b.v. of phenol into the heat/acid-resistant container.

2. Fill the pan about halfway full of water and place it on the heat source. This will function like a double boiler and make controlling temperatures easier.

3. Put the heat/acid resistant container with the phenol/acid mixture into the pan and slowly heat to about 100°C (212°F). Keep at this temperature until there is no longer an odor of phenol. This will take from 15 to 30 minutes. WARNING: Do not lean over the container and inhale deeply to check for the smell of phenol. The smell is fairly strong, so you will be able to check just by standing near the container and taking a LITTLE sniff.

4. Remove the container from the pan and allow the mixture to cool to below 30°C (86°F).

5. Gently stir 5 u.b.w.—2.75 p.b.v. of sulfuric acid into the phenol/acid mixture

6. Pour 1 u.b.w. of water into the acid-resistant container, then slowly stir 3 u.b.w.—1.6 p.b.v of sulfuric acid and 3 u.b.w of nitric acid into the water.

7. Fill the large pan with ice water. Set the container of water/nitric acid/sulfuric acid mixture into the pan of ice water and allow it to stand for 30 minutes.

8. Remove the water/ nitric acid/sulfuric acid mixture from the pan of ice water. Refill the pan with ice water.

9. Set the container of phenol/sulfuric acid into the pan of ice water.

10. Very slowly (one drop every 10 seconds) stir the water/nitric acid/sulfuric acid mixture to the phenol/sulfuric acid mixture. If the temperature of the phenol/acid mixture starts to approach 40°C (104°F), then stop adding the acid mixture (but continue stirring) and allow the phenol/acid mixture to cool to below 30°C (86°F) before continuing.

11. After all the water/nitric acid/sulfuric acid mixture has been added to the phenol/acid mixture, continue stirring for 10 minutes.

12. Remove the heat/acid resistant container from the pan and empty out the ice water. Refill the pan with plain water and place it on the heat source. Place several small

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pebbles in the pan to prevent the heat/acid-resistant container from resting directly on the bottom of the pan.

13. Place the heat/acid-resistant container back in the pan and very slowly heat the mixture to 80°C (176°F) and hold the mixture at this temperature for at least 1 full hour. Do not allow the temperature of the mixture to exceed 90°C (194°F) during this step. As soon as the temperature reaches 80°C (176°F), turn off the heat and allow the mixture to cool to 70°C (158°F) before turning the heat back on.

14. Remove the heat/acid-resistant container from the heat and allow the mixture to cool to room temperature.

15. Pour 14 u.b.w. of cold water into an acid-resistant container. Stir the mixture from step 14 into the water.

16. Filter the picric acid crystals out of the mixture by straining the mixture through filter paper or heavy cotton cloth.

17. While the crystals are still on the strainer, gently pour 6 u.b.w. of cold water over them to wash away the remaining acid.

18. The picric acid must now be dried. This can be done several different ways. Three methods are listed below.

A) The material can be dried using the sun. Spread the picric acid out on a large flat surface and leave in direct sunlight for several hours. This will only work if the air temperature is over 25°C (77°F).

B) The material can be dried using a hot water bath. Place a small amount of material in the bottom of an acid-resistant container (Type I). Fill a pan with hot (90°C/194°F) water and then place the container in the pan. Refill the pan with hot water as it cools.

C) The picric acid can be dried using an oven. First preheat the oven to 100°C (212°F). Then turn the oven off and wait 10 minutes. Place a small amount of picric acid in the bottom of a large acid-resistant container. Place the container into the oven. Let the material sit in the oven until either it is completely dry or the oven cools below 50°C (122°F). If the oven has cooled but the material is not dry, take the picric acid out of the oven and reheat the oven to

100°C (122°F). Again, turn the oven off and wait 10 minutes before placing the material back in the oven. Repeat this process until the material is dry. When using this method, it is a good idea to double-check the oven temperature with a second thermometer—if the oven is too hot, the material may explode.

If you use some other method, be sure to dry the material in small batches of about 14g (0.5oz) so if it should ignite accidentally, the damage will be minimized.

19. The picric acid is now ready for use. Store in a glass, ceramic, or plastic container.

ALTERNATE METHOD OF MANUFACTURE:

Chemicals required:
- Methyl alcohol/12 u.b.w.
- Sulfuric acid/22 u.b.w
- Potassium nitrate/2.25 u.b.w.
- Aspirin/1 u.b.w.
- Water

Other materials required:
- 2 acid-resistant containers (Type I)
- 1 heat/acid-resistant container (Type III)
- Large pan
- Filter paper OR
  - Cotton cloth
- Stirring rod (glass, ceramic or wood)
- Heat source

Procedure:

1. Crush the aspirin into a fine powder and place the powder into the first acid-resistant container.

2. Stir in just enough water to turn the aspirin powder into a thick paste

3. Stir the methyl alcohol into the aspirin paste and mix well.

4. Filter the aspirin/alcohol mixture through the filter paper. Keep the liquid and discard the solids left on the filter paper.

5. Evaporate the alcohol out of the mixture by placing the container in a pan filled with hot 80°C (176°F) water. This will leave a white powder in the container.

6. Gently pour the sulfuric acid into the heat/acid-resistant container.

7. Stir the white powder from step 5 into the sulfuric acid.

8. Place the pan on the heat source and fill with water.

9. Place the container with the mixture of sulfuric acid/white powder into the pan of water. Heat the water to a low simmer. Leave the mixture on the heat source for 15 minutes. The sulfuric acid/white powder mixture will change to a dark yellow color.

10. Remove the heat/acid-resistant container from the pan of hot water.

11. Slowly stir the potassium nitrate into the sulfuric acid/white powder mixture. The mixture will again change color—first to a red, then back to a dark yellow. WARNING: The fumes given off during this step are poisonous. Ensure adequate ventilation.

12. Allow the mixture to cool to room temperature. Stir this mixture every two minutes while cooling.

13. Thoroughly wash and dry the first acid-resistant container.

14. Pour 46 u.b.w. of cold water into the first acid-resistant container. Slowly stir the sulfuric acid/white powder/potassium nitrate mixture into the water.

15. Allow the mixture to stand for 15 minutes.

16. Filter the mixture though filter paper. The yellow crystals that collect on the filter paper are picric acid.

17. Pour 4 u.b.w. of cold water over the crystals to wash away impurities.

18. Dry using one of the methods listed in step 18 of the PREFERRED METHOD OF MANUFACTURE.

RDX A

Also called: Cyclonite, Cyclotrimethylenetrinitramine
Explosive type: high--secondary
Det. rate: 8500 m/s
Lead block test: 480cc
Chem. formula: C3H6N6O6
Form: colorless crystals
Deflagration temp.: 250°C (482°F)
Impact sensitivity: moderate– 7.5 Nm
Friction sensitivity: low—12 kp
Water sensitivity: none
Initiate with: blasting cap

RDX is the explosive component in the U.S. military's C-4. The main difference between RDX (A) and RDX (B) is the presence of HMX in RDX (B). The presence of HMX makes little, if any, practical difference in the material. Both are powerful explosives with excellent handling qualities. RDX is also a good material for use as a booster charge. Although RDX will detonate underwater, like most explosives it is more difficult to detonate when wet. So, a booster charge shou.d be used when using RDX as an underwater charge.

MANUFACTURE:

Chemicals required:
- Nitric acid (90%)/3 u.b w
- Hexamethylenetetramine/1 u.b w
- Sodium carbonate/0.05 u.b.w

Other materials required:
- 1 heat/acid-resistant container (Type III)
- Glass thermometer
- 1 acid resistant container (Type I)
- Large pan (for ice bath and hot water bath

Heat source

Procedure:

1. Pour the nitric acid into the heat/acid resistant container.

2. Place the heat/acid-resistant container into an ice water bath and allow the nitric acid to cool to 20°C (68°F).

3. While continuing to cool the acid, very slowly (1/4 teaspoon every 60 seconds) stir the hexamethlylenetetramine into the nitric acid. The temperature of the mixture will start to rise. Do not allow the temperature to exceed 30°C (86°F). If the temperature of the mixture starts to approach 30°C (86°F), then stop adding hexamethlylenetetramine and stir gently until the temperature drops to 20°C (68°F).

4. After the last of the hexamethlylenetetramine has been added, continue to cool and stir the mixture for 5 minutes. Then remove the mixture from the ice water bath and allow the mixture to stand until it reaches room temperature.

5. Empty the ice water out of the pan. Refill the pan with water and place the pan on the heat source.

6. Heat the water in the pan to 60°C (140°F). Remove the pan from the heat source.

7. Place the heat/acid-resistant container with the acid/hexamethlylenetetramine mixture into the pan of warm water and stir for 15 minutes. Remove the acid/hexamethlylenetetramine mixture from the pan of water and let the mixture stand for 15 minutes.

8. Pour 11 u.b.w. of COLD water into the acid-resistant container.

9. Slowly and gently stir in the acid/hexamethlylenetetramine mixture into the container of water. White crystals will settle out of the mixture. These crystals are RDX.

10. Filter the RDX crystals out of the mixture using either cotton cloth or paper towels.

11. Thoroughly rinse and dry the acid resistant container.

12. Gently place the RDX crystals and 11 u.b.w of water into the acid resistant container.

13. Add the sodium carbonate to the mixture in the acid-resistant container and stir gently for 5 minutes.

14. Filter the RDX crystals out of the mixture using either cotton cloth or paper towels.

15. If you are going to use the explosive within 3 days, proceed directly to step 24. If you need to store the RDX for longer then 3 days or if you are using it as an ingredient in another explosive, it must be purified.

To purify:

16. Thoroughly rinse and dry the heat/acid-resistant container.

17. Refill the pan with water. Heat the water to a low boil. Remove the pan from the heat source.

18. Pour 2 u.b.w. of acetone into the heat/acid-resistant container. Carefully place the container of acetone into the pan of hot water. Let the acetone warm to 50°C (122°F), stirring occasionally. If it becomes necessary to rewarm the water, remove the container of acetone before placing the pan back on the heat source.

19. Gently place the RDX into an acid-resistant container.

20. Very slowly stir warm acetone into the acid-resistant container just until all the RDX crystals dissolve.

21. Let the mixture stand for 30 minutes.

22. Pour an equal volume of COLD water into the acetone/RDX mixture. NOTE: If acetone is in short supply, you may omit this step and precipitate the RDX out of the acetone by cooling the acetone to 0°C (32°F). If cooling method of precipitation is used, the acetone may be reused up to 5 times before it must be discarded.

23. Filter the RDX crystals out of the mixture using either cotton cloth or paper towels.

24. The RDX must now be dried. This can be done several different ways. Three methods are listed below.

A) The material can be dried using the sun. Spread

the RDX out on a large flat surface and leave in direct sunlight for several hours. This will only work if the air temperature is over 25°C (77°F).

B) The material can be dried using a hot water bath. Place a small amount of material in the bottom of an acid-resistant container (Type I). Fill a pan with hot water and then place the container in the pan. Refill the pan with hot water as it cools.

C) The RDX can be dried using an oven. First preheat the oven to 100°C (212°F). Then turn the oven off and wait 10 minutes. Place a small amount of RDX in the bottom of a large acid-resistant container. Place the container into the oven. Let the material sit in the oven until either it is completely dry or the oven cools below 50°C (122°F). If the oven has cooled but the material is not dry, take the RDX out of the oven and reheat the oven to 100°C (212°F). Again, turn the oven off and wait 10 minutes before placing the material back in the oven. Repeat this process until the material is dry. When using this method, it is a good idea to double-check the oven temperature with a second thermometer—if the oven is too hot, the material may explode.

If you use some other method, be sure to dry the material in small batches of about 14g (0.5oz) so if it should detonate accidentally, the damage will be minimized.

RDX B

Also called: Cyclonite, Cyclotrimethylenetrinitramine
Explosive type: high—secondary
Det. rate: 8500 m/s
Lead block test: 480cc
Chem. formula: $C_3H_6N_6O_6$
Form: colorless crystals
Deflagration temp.: 250°C (482°F)
Impact sensitivity: moderate—7.5 Nm
Friction sensitivity: low—12 kp
Water sensitivity: none
Initiate with: blasting cap

RDX is the explosive component in the U.S. military's C-4. The main difference between RDX (A) and RDX (B) is the presence of HMX in RDX (B). The presence of HMX makes little, if any, practical difference in the material. Both are powerful explosives with excellent handling qualities. RDX is also a good material for use as a booster charge. Although RDX will detonate underwater, like most explosives it is more difficult to detonate when wet. So, a booster charge should be used when using RDX as an underwater charge.

MANUFACTURE:

Chemicals required:
Acetic anhydride/6.3 u.b.w.
Ammonium nitrate/2.6 u.b.w.
Paraformaldehyde/1 u.b.w. OR
Formaldehyde (37% solution)/2.5 u.b.w.
Acetone 25 u.b.w.
Water

Other materials required:
Heat/acid-resistant container (Type III)

Glass thermometer
Large pan
Heat source
Filter material (cotton cloth, paper towels, or filter paper)

Procedure:

1. Pour the acetic anhydride into the acid-resistant container.

2. Stir the ammonium nitrate into the acetic anhydride in the acid-resistant container. Continue stirring until the acetic anhydride and ammonium nitrate are well mixed.

3. Place the pan on the heat source.

4. Fill the pan with water and place the heat/acid-resistant container into the pan.

5. SLOWLY heat the acetic anhydride/ammonium nitrate mixture to 90°C (194°F), then turn off the heat.

6. Leave the container of acetic anhydride/ammonium nitrate in the pan of hot water. Very SLOWLY (1/4 teaspoon at a time) STIR the paraformaldehyde or formaldehyde into the acetic anhydride/ammonium nitrate mixture. WARNING: The fumes produced during this step are both flammable and toxic.

7. Allow the mixture to cool to room temperature.

8. Stir this mixture into 100 u.b.w. of COLD water.

9. Filter this new mixture through whatever filter material you are using. The crystals that are filtered out are RDX. If the explosive is going to be used as is within 3 days, it is not necessary to purify it. If the RDX must be stored for any length of time or it is going to be used in the manufacture of another explosive, then proceed to step 7.

To purify:

10. Thoroughly rinse and dry the heat/acid-resistant container.

11. Refill the pan with water. Heat the water to a low boil. Remove the pan from the heat source.

9. Pour 25 u.b.w. of acetone into the heat/acid-resistant container. Carefully place the container of acetone into the pan of hot water. Let the acetone warm to 50°C (122°F), stirring occasionally. If it becomes necessary to rewarm the water, remove the container of acetone before placing the pan back on the heat source.

10. Gently place the RDX into an acid-resistant container.

11. Very slowly stir warm acetone into the acid-resistant container just until all the RDX crystals dissolve.

12. Let the mixture stand for 30 minutes.

13. Pour an equal volume of COLD water into the acetone/RDX mixture. NOTE: If acetone is in short supply, you may omit this step and precipitate the RDX out of the acetone by cooling the acetone to 0°C (32°F). If cooling method of precipitation is used, the acetone may be reused up to 5 times before it must be discarded.

14. Filter the RDX crystals out of the mixture using either cotton cloth, paper towels, or filter paper.

15. The RDX must now be dried. This can be done several different ways. Three methods are listed below.

A) The material can be dried using the sun. Spread the RDX out on a large flat surface and leave in direct sunlight for several hours. This will only work if the air temperature is over 25°C (77°F).

B) The material can be dried using a hot water bath. Place a small amount of material in the bottom of an acid-resistant container (Type I). Fill a pan with hot water and then place the container in the pan. Refill the pan with hot water as it cools.

C) The RDX can be dried using an oven. First preheat the oven to 100°C (212°F). Then turn the oven off and wait 10 minutes. Place a small amount of RDX in the bottom of a large acid-resistant container. Place the container into the oven. Let the material sit in the oven until either it is completely dry or the oven cools below 50°C (122°F). If the oven has cooled but the material is not dry, take the RDX out of the

oven and reneat the oven to 100°C (212°F). Again, turn the oven off and wait 10 minutes before placing the material back in the oven. Repeat this process until the material is dry. When using tn.s method, it is a good idea to double-check the oven temperature with a second thermometer—if the oven is too hot, the material may explode.

If you use some other method, be sure to dry the material in small batches of about 14g (0.5oz) so if it should detonate accidently, the damage will be minimized.

SEMTEX

Explosive type: high—secondary
Det. rate: approx. 8000 m/s
Lead block test: approx. 500cc
Chem. formula: mixture of RDX, PETN, and petroleum jelly
Form: plastic
Deflagration temp.: e.n.u.
Impact sensitivity: high—e.n.u.
Friction sensitivity: moderately low—e.n.u.
Water sensitivity: none
Initiate with: blasting cap

Semtex is a powerful plastic explosive that is more sensitive to initiation than Composition C. As was mentioned in the safety section of this book, respiratory protection must be used when performing this procedure, as RDX dust is toxic.

MANUFACTURE:

Chemicals required:
- RDX/4.5 u.b.w.
- PETN/4.5 u.b.w.
- Lecithin (optional)/0.1 u.b.w.
- Petroleum jelly/1 u.b.w. OR
  - Castor oil/1 u.b.w. OR
  - Vegetable oil (any type)/1 u.b.w.

Other materials required:
- Wooden board
- Rolling pin
- 1 container with lid (any type)

Procedure

1. Using the wooden board and rolling pin, crush ONE HALF TEASPOON of RDX at a time into a FINE powder.

WARNING: Do NOT grind the RDX that could detonate the material. Also, keep the rest of the RDX several meters away from the material you are crushing.

2. Place the powdered RDX into a container with a lid. NOTE: A paper or plastic bag may be used.

3. Using the same procedure, FINELY powder the PETN. It is very important that both the RDX and PETN are finely powdered; any uncrushed granules in the powder are a safety hazard.

4. Place the powdered PETN into the container with the powdered RDX. Mix the two explosives together by GENTLY shaking the container for several minutes.

5. Place the petroleum jelly into the heat-resistant container and place it on the heat source until it melts.

6. Stir the lecithin into the melted petroleum jelly. The lecithin helps prevent the formations of large RDX crystals, which would increase the sensitivity of the material. It is possible to make Semtex without using lecithin, but the resulting material will have to be handled with even greater care than normal.

7. Slowly stir the hot petroleum jelly/lecithin mixture into the RDX/PETN powder and mix well. Working in small batches makes this easier and safer. If you used a paper or plastic bag to mix the RDX/PETN powders, place the powder into a solid container before proceeding with this step.

8. If this material is to be stored for a long time, it should be stored in an airtight container. If Semtex is left exposed to air for a long period of time, the material will harden, thereby losing its plastic properties. If this happens, the material can be softened by dipping it in vegetable oil and letting it stand for 1 hour. Then, gently knead the material until it becomes soft. Repeat this step if necessary.

SILVER ACETYLIDE

Also called: Double Salts/Silver Carbide
Explosive type: high—primary
Det. rate: e.n.u.
Lead block test: e.n.u.
Chem. formula: AgN_3
Form: white crystals
Deflagration temp.: 200°C (392°F)
Impact sensitivity: extremely high—e.n.u.
Friction sensitivity: extremely high—e.n.u.
Water sensitivity: moderate
Initiate with: spark

There is little information readily available on silver acetylide. However, it is an effective primary explosive. Like all primary explosives, this material is very sensitive to impact, friction, and sparks.

MANUFACTURE:

Chemicals required:
- Nitric acid (90%)/4.5 u.b.w.
- Silver/1 u.b.w.
- Methyl alcohol (70+%)/25 u.b.w. OR
  - Isopropyl alcohol(70+%)/25 u.b.w. OR
  - Ethyl alcohol (70+%)/25 u.b.w.
- Acetylene/any size canister
- Water

Other materials required:
- 1 heat/acid-resistant container (Type III)
- 1 acid-resistant container (Type I)
- Large pan
- Heat source
- Tubing (one end must connect to the acetylene canister)

Filter paper
Stirring rod (glass OR ceramic)

Procedure:

1. Gently pour 3 u.b.w. of water into the heat/acid-resistant container.

2. Slowly stir the nitric acid into the water.

3. Gently place the silver metal into the water/acid mixture. Let this mixture stand until the silver dissolves completely. NOTE: The solution will turn greenish as the silver dissolves. If the silver does not completely dissolve after 1 hour, stir 1 additional drop of nitric acid to the mixture every 5 minutes until it does.

4. Fill the pan with water and place it on the heat source.

5. Place the container with the water/nitric acid/silver mixture into the pan. Heat this mixture until crystals form in the mixture and then dissolve again. WARNING: The fumes from this step are highly toxic.

6. While continuing to gently heat the mixture; use the tubing and the canister of acetylene to GENTLY bubble acetylene through the mixture for 5 to 10 minutes. NOTE: The brown fumes will be given off at this stage, and small flakes will appear in the solution.

7. Remove the mixture from the heat source and allow it to cool to room temperature.

8. Filter the solid material out of the mixture using the filter paper. This greenish solid material is silver acetylide. It is green because of impurities in the material.

9. Slowly pour 25 u.b.w. of alcohol over the crystals. They will turn white as you wash them. If you are preparing several batches of this material, it is permissible to reuse this alcohol to wash up to three additional batches.

10. Dry the material using a hot water bath. Place the crystals in an acid-resistant container and set the container in a pan of hot (90°C/194°F) water. WARNING: This material is a primary explosive. It must be handled very gently.

SILVER POWDER

Explosive type: both low and high
Det. rate: e.n.u.
Lead block test: e.n.u.
Chem. formula: mixture of sodium chlorate and aluminum powder
Form: dry silver powder
Deflagration temp.: e.n.u.
Impact sensitivity: very high—e.n.u.
Friction sensitivity: very high—e.n.u.
Water sensitivity: high
Initiate with: blasting cap, squib (if using as a low explosive)

There is very little specific information readily available on this explosive because it is not used commercially. It is, however, an effective explosive, similar in power to cheddite type O. Whenever possible, this explosive should be tightly contained, as it loses most of its effectiveness when detonated in the open. Finally, if the materials are not powdered very finely, the final product will be difficult to detonate. This explosive is VERY sensitive to impact, friction, and sparks, so use great care when working with this material.

MANUFACTURE:

Chemicals required:
Sodium chlorate/3 u.b.w OR
Potassium perchlorate/3 u.b.w. OR
Sodium perchlorate/3 u.b.w.
Aluminum powder/1 u.b.w.

Other materials required:
Acid resistant container (Type I)
Stirring rod (glass, ceramic, or wood)

Procedure:

1. Pour the two materials into the container and mix GENTLY with the wooden stirring rod. In the interest of safety, do not mix more then 28g (1oz) at a time.

2. Store in an airtight container.

SULFURLESS BLACK POWER

Explosive type: low
Burn rate: 1500 m/s max.
Chem. formula: mixture of KNO3 and charcoal
Form: dry gray or black powder
Deflagration temp.: approx. 300°C (572°F)
Impact sensitivity: e.n.u.
Friction sensitivity: e.n.u.
Water sensitivity: high
Initiate with: squib, blasting cap, or fuse

Sulfurless black powder has a higher burn rate than standard black powder. However, it produces considerably less gaseous material. These qualities make it better for tightly contained fragmentation charges but less effective as a propellant or blasting charge.

PREFERRED METHOD OF MANUFACTURE:

Chemicals required:
- Potassium nitrate/8.2 u.b.w. OR
  - Sodium nitrate/8.2 u.b.w.
- Wood charcoal (powdered)/2 u.b.w.
- Methyl alcohol/10 u.b.w. OR
  - Isoprophyl alcohol (70+% pure)/10 u.b.w. OR
  - Ethyl alcohol (70+% pure)/10 u.b.w.
- Water

Other materials required:
- 1 heat-resistant container (Type II)
- 1 wooden stirring rod (stick, wooden spoon, etc.)
- Screen (metal or stiff plastic) with .25 inch or smaller openings. Screen should be at least 6x12 inch OR
  - Cheese grater (metal or plastic)
- Cotton cloth (18in by 18in)
- Heat source

Procedure:

1. Place the potassium nitrate, charcoal, and 5 u.b.w. of water into the heat-resistant container and stir well.

2. Place the heat-resistant container on the heat source and stir until small bubbles appear or until the mixture becomes HOT to the touch. Do NOT boil the mixture or allow it to dry on the sides of the container, as it may ignite.

3. Remove mixture from heat and allow to cool to room temperature.

4. Pour the alcohol into the mixture and stir well.

5. Strain mixture through the cloth.

6. Wrap the cloth around the mixture and gently squeeze out all remaining liquid.

7. Granulate the black powder by rubbing a small handful across the screen or the finer openings of a cheese grater.

8. The black powder must now be dried. This can be done several different ways. Three methods are listed below.

A) The powder can be dried using the sun. Spread the black powder out on a large flat surface and leave in direct sunlight for several hours. This will only work if the air temperature is over 25°C (77°F).

B) The powder can be dried using a hot water bath. Place about 1cm (0.4in) of powder in the bottom of an acid-resistant container (Type I). Fill a pan with hot water and then place the container in the pan. Refill the pan with hot water as it cools.

C) The powder can be dried using an oven. First preheat the oven to 150°C (300°F). Then turn the oven off and wait 10 minutes. Place a small amount of black powder in the bottom of a large pot or pan. Place the pot/pan into the oven. Let the material sit in the oven until either it is completely dry or the oven cools below 66°C (150°F). If the oven has cooled but the powder is not dry, take the black powder out of the oven and reheat the oven to 150°C (300°F). Again, turn the oven off and wait 10 minutes before placing the black powder back in the oven. Repeat this process until the powder is dry. When using this method it is a good idea to double-check the oven temperature with a second thermometer—if the oven is too hot, the material may explode.

If you use some other method, be sure to dry the black powder in small batches of about 26g (1oz) so if the powder does ignite accidently, the damage will be minimized.

9. The powder can be made into finer grains (if necessary) by spreading a teaspoonful of the powder at a time onto a flat surface and then gently crushing it. Be sure to keep the rest of the black powder well away from the powder that is being crushed in case the powder that is being crushed should ignite.

10. Store in waterproof container.

ALTERNATE METHOD OF MANUFACTURE:

Chemicals required:

- Potassium nitrate/9.5 u.b.w. OR
  Sodium nitrate/10 u.b.w.
- Wood charcoal (powdered)/2 u.b.w.
- Water

Other materials required:

- 1 heat-resistant container (metal, ceramic, etc.)
- 1 wooden stirring rod (stick, wooden spoon, etc.)
- Screen (metal or stiff plastic) with .25 inch or smaller openings. Screen should be at least 6x12 inch OR
  Cheese grater (metal or plastic)
- Cloth (shirt, sheet, etc.) at least 18x18 inch
- Heat source

Procedure:

1. Place the potassium nitrate, charcoal, and 5 u.b.w. of water into the heat resistant container and stir well.

2. Place the container on the heat source and stir until small bubbles appear or until the mixture becomes HOT to the touch. Do NOT boil mixture or allow it to dry on the sides of the container, as it may ignite.

3. Remove the mixture from heat and allow to cool until the mixture feels slightly cool to the touch. Then proceed to step 4.

4. Strain the mixture through the cloth.

5. Wrap the cloth around the mixture and gently squeeze out all remaining liquid.

6. Granulate the black powder by rubbing a small handful across the screen or cheese grater.

7. Dry using one of the methods listed in step 8 of the PREFERRED METHOD OF MANUFACTURE.

8. The powder can be made into finer grains (if necessary) by spreading a teaspoonful of the powder at a time onto a flat surface and then gently crushing it. Be sure to keep the rest of the black powder well away from the powder that is being crushed in case the the powder that is being crushed should ignite.

9. Store in a waterproof container.

SULFURLESS BLACK POWDER (DRY MIXED)

Explosive type: low
Burn rate: 1200 m/s max.
Chem. formula: mixture of KNO3 and charcoal
Consistency: dry gray or black powder
Deflagration temp.: approx. 300°C (572°F)
Impact sensitivity: e.n.u.
Friction sensitivity: e.n.u.
Water sensitivity: high
Initiate with: squib, blasting cap, or fuse

Dry mixed powders are somewhat less powerful then wet mixed, but they are quicker to produce. Sulfurless black powder has a higher burn rate than standard black powder. However, it produces considerably less gaseous material. These qualities make it better for tightly contained fragmentation charges but less effective as a propellant or blasting charge. Also, the effectiveness of the explosive depends on how finely the ingredients are powdered BEFORE the powder is mixed.

MANUFACTURE:

Chemicals required:

Potassium nitrate (powdered)/7.5 u.b.w. OR
Sodium nitrate (powdered)/7.5 u.b.w.
Wood charcoal (powdered)/2 u.b.w.

Other materials required:

1 container (any type)
1 wooden stirring rod (stick, wooden spoon, etc.)

Procedure:

1. Place potassium nitrate and charcoal into contain-

er and mix gently but thoroughly. For the sake of safety, do not mix more then 100g (4oz) at a time.

2. Store the mixture in a waterproof container.

TETRAZENE

Also called: Tetracene
Explosive type: high—primary
Det. rate: e.n.u
Lead block test. 155cc
Chem. formula: C2H8N10O
Form: colorless or light yellow crystals
Deflagration temp.: 140°C (294°F)
Impact sensitivity: extremely high—1 Nm
Friction sensitivity: extremely high —e.n.u.
Water sensitivity: moderate
Initiate with: spark

Tetrazene is a relatively weak primary explosive. It should always be used with a sensitive booster charge such as PETN. When used in the manufacture of detonators, tetrazene should be freely poured into a capsule. Tetrazene loses much of its effectiveness when pressed.

MANUFACTURE:

Chemicals required:
- Sodium nitrate/1.75 u b.w.
- Aminoguanidine carbonate/2.16 u.b.w.
- Acetic acid/1 u.b.w
- Water

Other materials required
- Heat source
- Heat/acid resistant container (Type II)
- Filter paper
- Thermometer
- Stirring rod (glass)

Procedure:

1. Pour 160 u.b.w. of water into the heat/acid-resistant container.

2. Stir 1 u.b.w. of acetic acid into the water.

3. Slowly heat the water/acetic acid solution to 60°C (140°F).

4. Remove the water/acetic acid solution from heat.

5. Slowly dissolve 2.16 u.b.w. of aminoguanidine carbonate into the water/acetic acid solution.

6. Allow the water/acetic acid/aminoguanidine carbonate solution to cool to 30°C (86°F).

7. Stir 1.75 u.b.w. of sodium nitrate into the water/acetic acid/aminoguanidine carbonate solution.

8. Allow this new mixture to stand for 4 hours, then stir the mixture VERY vigorously.

9. Allow the mixture to stand for 24 hours. Crystals of tetrazene will settle out of the mixture.

10. Filter the tetrazene out of the mixture using the filter paper.

11. Slowly pour 20 u.b.w. of warm water over the tetrazene crystals to wash away impurities.

12. While they are still on the filter paper, pour 10 u.b.w. of alcohol over the tetrazene crystals.

13. Spread the crystals out on a flat surface and allow to air dry.

TETRYL

Also called: trinitrophenylmethylnitramine
Explosive type: high—secondary
Det. rate: 7500 m/s
Lead block test: 400cc
Chem. formula: C7H5N5O8
Form: dry pale yellow crystals
Deflagration temp.: 185°C (365°F)
Impact sensitivity: very high—3 Nm
Friction sensitivity: low—36+ kp
Water sensitivity: none
Initiate with: blasting cap

Tetryl is an excellent explosive to use as a booster charge. Although tetryl is not damaged by contact with water, it does become very difficult to detonate when very wet.

MANUFACTURE:

Chemicals required:

Nitric acid (67%) (s.g. 1.4)/40 u.b.w.-28.6 p.b.v. OR
Nitric acid (90%) (s.g. 1.48)/29.8 u.b.w—20.1 p.b.v. AND
Water/10.2 u.b.w.—1 p.b.v.
Dimethylaniline/1 u.b.w.—1 p.b.v.
Water

Other materials required:

Method of cooling (ice water bath, freezer, snow, etc.)
Heat source
Heat/acid-resistant container (Type III)
Acid-resistant container (Type I)
Large pan
Glass thermometer
Stirring rod (glass or ceramic)

Filter paper OR
Cotton cloth (sheet, shirt, etc.)

Procedure:

1. Gently pour the nitric acid into the heat/acid-resistant container. If you are using 90% nitric acid, pour 10.2 u.b.w.-10.2 p.b.v. of water into the container BEFORE stirring in the nitric acid.

2. Cool both the nitric acid and the dimethylaniline to 0°C (32°F).

3. While continuing to cool the nitric acid, very slowly STIR the dimethylaniline into the nitric acid. If the temperature of the mixture starts to rise above 5°C (41°F), stop adding dimethylaniline and allow the mixture to cool to 0°C (32°F).

4. Remove the mixture from cooling and allow to stand for 1 hour.

5. Place the pan on the heat source and fill it halfway with water.

6. Place the heat/acid-resistant container with the acid/dimethylaniline mixture into the pan of water.

7. SLOWLY heat mixture to 80°C (176°F). As this mixture approaches 80°C (176°F), it will start to bubble and emit fumes. When this happens, turn the heat off and allow the mixture to settle. Once it has settled, turn the heat back on. Continue to alternate turning the heat on and off until the mixture can be heated to 90°C (194°F) without bubbling. NOTE: The mixture will still give off reddish fumes when heated.

8. Allow this mixture to cool to room temperature. As this mixture cools, crystals of tetryl will settle out of the liquid.

9. Pour 50 u b.w.-50 p.b.v. of water into the acid-resistant container.

10. Slowly stir the tetryl mixture into the water.

11. Filter the solids out of the mixture using filter paper or cotton cloth. These solids are the explosive.

12. Rinse and dry the heat/acid resistant container.

13. Fill the heat-resistant container with water. Heat the water to a boil, then remove the container from the heat source.

14. Gently place the tetryl into the container of hot water and stir for 15 minutes.

15. Filter out the tetryl using a clean piece of cloth.

16. The tetryl must now be dried. This can be done several different ways. Three methods are listed below.

A) The material can be dried using the sun. Spread the tetryl out on a large flat surface and leave in direct sunlight for several hours. This will only work if the air temperature is over 25°C (77°F).

B) The material can be dried using a hot water bath. Place a small amount of material in the bottom of an acid-resistant container (Type I). Fill a pan with hot water and then place the container in the pan. Refill the pan with hot water as it cools.

C) The tetryl can be dried using an oven. First preheat the oven to 100°C (212°F). Then turn the oven off and wait 10 minutes. Place a small amount of tetryl in the bottom of a large acid-resistant container. Place the container into the oven. Let the material sit in the oven until either it is completely dry or the oven cools below 50°C (122°F). If the oven has cooled but the material is not dry, take the tetryl out of the oven and reheat the oven to 100°C (212°F). Again, turn the oven off and wait 10 minutes before placing the material back in the oven. Repeat this process until the material is dry. When using this method, it is a good idea to double-check the oven temperature with a second thermometer—if the oven is too hot, the material may explode.

If you use some other method, be sure to dry the material in small batches of about 14g (0.5oz) so if it should detonate, the damage will be minimized.

17. Store in a suitable container.

TNT

A so called: Trinitrotoluene
Explosive type: high—secondary
Det. rate: 6900 m/s
Lead block test: 300cc
Chem. formula: C7H5N3O6
Form: pale yellow crystals
Deflagration temp.: 300°C (572°F)
Impact sensitivity: moderately low—15 Nm
Friction sensitivity: low--36+ kp
Water sensitivity: low
Initiate with: blasting cap

TNT is an excellent explosive, but it is quite complex to produce, so I would not recommend trying to manufacture TNT unless you have good equipment available. A mistake in temperature could have disastrous results. Also, the manufacture of TNT produces large quantities of poisonous gasses, so it is imperative that you have excellent ventilation.

NOTE: If you are producing several batches, it is possible to reclaim some sulfuric acid from the waste acids. The sulfuric acid recovered from the waste acids of the third nitration (DNT to TNT) may be refined and used in the second nitration (MNT to DNT) of the FOLLOWING batch. Likewise, the sulfuric acid recovered from the waste acids of the second nitration (MNT to DNT) may be refined and used in the first nitration (toluene to MNT) of the FOLLOWING batch. Thus, the sulfuric acid may be used three times before it must be discarded.

The purification process is simple: Pour the waste acid into a heat/acid-resistant container and heat until heavy white fumes appear. The resulting product is FAIRLY pure sulfuric acid and may be used as such.

Do NOT attempt to use any of the acid thus reclaimed for the final nitration process (DNT to TNT), as there will be some impurities left in the acid. Also, you may NOT refine waste acid from the first process (toluene to MNT) and use it for the second process (MNT to DNT). If you have ANY doubts, use fresh acid.

MANUFACTURE:

Chemicals required:
- Sulfuric acid/31.39 u.b.w.—17.3 p.b.v.
- Nitric acid (90%)/13 u.b.w.—8.75 p.b.v.
- Toluene/6.50 u.b.w.—7.5 p.b.v.
- Water

Other materials required:
- Heat source
- Glass thermometer
- Stirring rod (glass)
- Filter paper
- 2 large pans
- 1 heat/acid-resistant container (Type III)
- 2 acid-resistant containers (Type I)

Procedure:

1. Cool all chemicals to below 10°C (50°F). A refrigerator works very well for this step.

2. Pour 2.52 u.b.w. of water into the first acid-resistant container, then slowly stir in 8.85 u.b.w. of sulfuric acid and 4.5 u.b.w. of nitric acid. Let this mixture stand for 1 hour.

3. Pour the toluene into the heat/acid-resistant container. Fill the first pan with a mixture of ice and water, then place the container of toluene into the pan. Allow the toluene to stand in the ice water bath for 10 minutes.

4. While continuing to cool the toluene, very slowly (one drop every 10 seconds) STIR the acid mixture into the

toluene. If the temperature of the toluene/acid mixture starts to approach 40°C (104°F), then stop adding acid and allow the toluene/acid mixture to cool to below 20°C (68°F) before continuing.

5. Fill the second pan about halfway with plain water. Place several small pebbles in the bottom of the second pan—this will prevent the heat/acid-resistant container from resting directly on the pan. This will function like a double boiler and make controlling temperatures easier.

6. Put the heat/acid-resistant container into the pan and SLOWLY heat the toluene/acid mixture to 65°C (149°F). Keep the toluene/acid mixture between 55°C (131°F) and 65°C (149°F) for 1 hour by turning off the heat when the mixture approaches 65°C (149°F) and allowing the mixture to cool to 55°C (131°F) before turning the heat back on.

7. Remove from heat and allow the mixture to stand until cool (room temperature).

8. As the mixture cools, it will separate into two layers. Gently pour the top layer (now MNT) into the second acid-resistant container. The bottom layer (waste acid) should be discarded.

9. Rinse the heat/acid-resistant container with water, then dry it thoroughly.

10. Pour the top layer back into the heat/acid-resistant container.

11. Rinse and dry both acid-resistant containers.

12. Slowly stir 0.98 u.b.w. of water, 8.54 u.b.w. of sulfuric acid, and 4.50 u.b.w. of nitric acid into the first acid-resistant container and mix well.

13. Using the ice water bath, cool the water/acid mixture and the MNT to below 20°C (68°F).

14. While continuing to cool the MNT, very slowly (one drop every 10 seconds) STIR the acid mixture into the MNT. If the temperature of the MNT/acid mixture starts to approach 40°C (104°F), then stop adding acid (but continue stirring) and allow the MNT/acid mixture to cool to below 20°C (68°F), then continuing. This is the same as step 4.

15. Put the heat/acid-resistant container into the second pan (the one being used as a double boiler) and slowly heat the MNT/acid mixture to 94°C (201°F). Keep the MNT/acid mixture between 84°C (183°F) and 94°C (201°F) for 30 minutes by turning off the heat when the mixture approaches 94°C (201°F) and allowing the mixture to cool to 84°C (183°F) before turning the heat back on.

16. Remove the MNT/acid mixture from heat and allow it to cool to 66°C (150°F). The mixture will again separate into two layers.

17. The top layer (now DNT) should again be gently poured into the second acid-resistant container. The bottom layer (waste acid) should be discarded (or refined).

18. Rinse the heat/acid-resistant container with water then dry it thoroughly.

19. Rinse and dry the first acid-resistant container.

20. Slowly stir 10.0 u.b.w. of sulfuric acid into the second acid-resistant container with the DNT. That should be the last of the sulfuric acid if you have done everything correctly.

21. Put the second acid-resistant container (DNT/acid) into the second pan of water (double boiler) and VERY SLOWLY heat the DNT/acid mixture to 65°C (149°F). While this is heating, proceed to step 22.

22. Carefully pour 4 u.b.w. of sulfuric acid and 4 u.b.w. of nitric acid into the heat/acid-resistant container and stir well. Place the heat/acid-resistant container directly onto the second heat source. SLOWLY heat the acid mixture to 85°C (185°F) and keep between 80°C (176°F) and 85°C (185°F) until the DNT/acid mixture is ready.

23. Both mixtures must be at their proper temperatures before proceeding.

24. Turn off all heat sources.

25. Very slowly (one drop every 10 seconds) STIR the DNT/acid mixture into the heat acid resistant container. The temperature of the DNT/acid mixture in the heat/acid-resistant container may rise. This is fine as long as the temperature does not exceed 90°C (194°F). If the temperature starts to

approach 90°C (194°F), then stop adding acid until the mixture cools to 80°C (176°F).

26. Allow the mixture to stand for 20 minutes.

27. Place the pan back onto the first heat source. Add more water if necessary.

28. Put the heat/acid-resistant container into the pan.

29. SLOWLY heat the DNT/acid mixture to 100°C (212°F). Keep the DNT/acid mixture between 96°C (204°F) and 100°C (212°F) for 1 full hour by turning off the heat when the mixture approaches 100°C (212°F) and allowing the mixture to cool to 94°C (204°F) before turning the heat back on.

30. Allow the mixture to cool to 85°C (185°F).

31. Stir the mixture into 12 u.b.w.—12 p.b.v. of cold water. The TNT will solidify into small pellets.

32. Allow the mixture to stand for 30 minutes, gently stirring every 5 minutes.

33. Filter the TNT out of the mixture with a piece of cotton cloth or filter paper.

34. Rinse and dry the heat/acid-resistant container.

35. Put the TNT back into the heat/acid-resistant container, then add water until the container is almost full.

36. Put the heat/acid-resistant container directly on a heat source and GENTLY simmer for 30 minutes. NOTE: the TNT will melt during this process.

37. Fill the large container with cold water equal in volume to the TNT/water mixture.

38. Stir the TNT/water mixture into the large container. The TNT will again form into pellets.

39. Filter the TNT out of the water using a clean piece of cotton cloth or filter paper.

40. The TNT must now be dried. Two methods are listed below.

A) The material can be dried using the sun. Spread the TNT out on a large flat surface and leave in direct sunlight for several hours. This will only work if the air temperature is over 25°C (77°F).

B) The material can be dried using a hot water bath. Place a small amount of material in the bottom of an acid resistant container (Type I). Fill a pan with hot water and then place the container in the pan. Refill the pan with hot water as it cools.

Drying this material using the oven method described elsewhere is not recommended for this material. TNT melts around 80°C (176°F).

41. Store in a suitable container.

UREA NITRATE

Explosive type: high—secondary
Det. rate: e.n.u.
Lead block test: 270cc
Chem. formula: CH5N3O4
Form: colorless crystals
Deflagration temp.: 186°C (367°F)
Impact sensitivity: low—50+ Nm
Friction sensitivity:low—36+ kp
Water sensitivity: moderate
Initiate with: blasting cap

Urea nitrate is a moderately powerful explosive that is quite simple to manufacture and relatively safe to handle. The main drawback of the material is that it cannot be stored for extended periods of time due to a poor chemical stability. It is recommended that the material be used within 30 days of manufacture.

MANUFACTURE:

Chemicals required:
Urea 20% solution/3 u.b.w—3 p.b.v
Nitric acid (90%)/1 u.b.w—0.7 p.b.v
Water

Other materials required:
Acid-resistant container (Type I)
Filter paper
Stirring rod (glass)

Procedure:
1. If possible, cool all materials to 10°C (50°F).
2. Pour the urea solution into the acid resistant container

3. Very slowly STIR the nitric acid into the urea solution.
4. Let the mixture stand for 1 hour. Urea nitrate crystals will settle out of the mixture during this time
5. Filter urea nitrate crystals out of the liquid using the filter paper and discard the liquid.
6. Slowly pour 1 u.b.w.—1 p.b.v. of COLD water over the crystals to wash them.
7. The material can be dried using a hot water bath. Place a small amount of material in the bottom of an acid-resistant container (Type I). Fill a pan with hot water (90°C/194°F) and then place the container in the pan. Refill the pan with hot water as it cools.
8. Store the material in an acid-resistant container.

WHITE POWDER

Explosive type: both low and high
Det. rate: e.n.u.
Lead block test: e.n.u.
Chem. formula: mixture of sodium chlorate and sucrose
Form: white dry powder
Deflagration temp.: e.n.u.
Impact sensitivity: very high—e.n.u.
Friction sensitivity: very high—e.n.u.
Water sensitivity: high
Initiate with: blasting cap, squib (if using as a low explosive)

There is very little specific information readily available on this explosive because it is not used commercially. It is, however, an effective explosive, similar in power to cheddite type O. Whenever possible, this explosive should be tightly contained, as it loses most of its effectiveness when detonated in the open. This explosive is very sensitive to impact, friction, and sparks, so use great care when working with this material.

MANUFACTURE:

Chemicals required:
- Sodium chlorate/3 u.b.w OR
  - Potassium perchlorate/3 u.b.w. OR
  - Sodium perchlorate/3 u.b.w.
- Sucrose/1.2 u.b.w.

Other materials required:
- Container (glass, ceramic, or plastic)
- Stirring rod (wooden)

Procedure:
1. Pour the two materials into the container and mix

gently with the wooden stirring rod. For the sake of safety, do not mix more than 50g (2oz) at a time.
2. Store in an airtight container.

COMPONENT MATERIALS

ACETIC ACID
Also called: glacial acetic acid, ethanoic acid
Form: colorless liquid
Chem. formula: C2H4O2
Sp. gr.: 1.05
Toxic effects: Both vapor and liquid are a severe irritant to eyes, skin, and respiratory tract.
Notes: See M.S.D.S.

ACETIC ANHYDRIDE
Also called: –
Form: colorless liquid
Chem. formula: (CH3CO)2O
Sp. gr.: 1.08
Toxic effects: Vapor is a severe irritant to eyes, skin, and respiratory tract. Liquid causes chemical burns.
Notes: See M.S.D.S.

ACETONE
Also called: propanone
Form: colorless liquid
Chem. formula: CH3COCH3
Sp. gr.: 0.79
Toxic effects: Vapor is toxic. Liquid is an eye hazard.
Notes: Acetone from hardware stores is suitable for explosive purposes.

ALUMINUM (powdered)
Also called: –
Form: silvery powder

Chem. formula: Al
Sp. gr.: 2.70
Toxic effects: Irritant to eyes and respiratory tract.
Notes: This material must be finely powdered for explosive uses.

AMMONIUM NITRATE
Also called: –
Form: colorless crystals
Chem. formula: NH4NO3
Sp. gr.: 1.72
Toxic effects: Irritant to eyes, skin, and respiratory tract. Prolonged exposure may cause possible gastrointestinal upsets and blood disorders.
Notes: This material is often available in prill form as a fertilizer. For use in ANFO, the fertilizer should be listed as at least 33.33% nitrogen. This material reacts hazardously with brass and copper.

AMMONIUM PERCHLORATE
Also called: –
Form: colorless crystals
Chem. formula: NH4ClO3
Sp. gr.: 1.95
Toxic effects: Dust is toxic. Toxic through skin contact.
Notes: See M.S.D.S.

ANILINE
Also called: aminobenzene
Form: colorless oil
Chem. formula: C6H5NH2
Sp. gr.: 1.02
Toxic effects: Vapor is toxic. Liquid is toxic through skin contact.
Notes: See M.S.D.S

CARBON TETRACLORIDE
Also called: –
Form: colorless liquid
Chem. formula: CC14
Sp. gr.: 1.59
Toxic effects: Vapor is toxic. Liquid is an irritant to skin.
Notes: See M.S.D.S.

CASTOR OIL
Also called: –
Form: thick oil
Chem. formula: varies
Sp. gr.: Approx. 0.8
Toxic effects: Minor.
Notes: This material is the standard castor oil available at any drug store.

CITRIC ACID
Also called: –
Form: white crystals
Chem. formula: C6H8O7
Sp. gr.: 1.54
Toxic effects: Dust is an irritant to eyes and respiratory tract.
Notes: –

COOKING OIL
Also called: vegetable oil (any type)
Form: varies
Chem. formula: varies
Sp. gr.: varies
Toxic effects: Minor.
Notes: Any liquid vegetable oil is acceptable.

DEXTRIN
Also called: Dextran, starch gum
Form: off-white powder
Chem. formula: (C6H10O5)x

Sp. gr.: 1.03
Toxic effects: Irritant to eyes and respiratory tract.
Notes: –

DIESEL OIL
Also called: #2 fuel oil, diesel fuel
Form: yellowish oil
Chem. formula: varies
Sp. gr.: approx. 0.8
Toxic effects: Toxic if ingested. Eye irritant.
Notes: This material is standard diesel fuel or heating oil.

DIMETHYLANILINE
Also called: –
Form: yellow liquid
Chem. formula: (CH3)2NC6H5
Sp. gr.: 0.95
Toxic effects: Vapor is toxic. Liquid is toxic through skin contact.
Notes: See M.S.D.S.

ETHYL ALCOHOL
Also called: ethanol
Form: colorless liquid
Chem. formula: CH3CH2OH
Sp. gr.: 0.98
Toxic effects: Toxic if an excess is ingested. Remember your last hangover?
Notes: This is straight grain alcohol. Alcoholic beverages of high proof CANNOT be used for explosive purposes, as most of them contain a considerable amount of sugar.

FORMALDEHYDE (37% solution)
Also called: –
Form: colorless liquid
Chem. formula: HCHO
Sp. gr.: 1.08

Toxic effects: Vapor is toxic. Liquid is an eye and skin irritant.
Notes: See M.S.D.S.

GLYCERIN
Also called: glycerol
Form: colorless liquid
Chem. formula: CHOH(CH2OH)2
Sp. gr.: 1.26
Toxic effects: Liquid is an irritant to eyes.
Notes: This material must be clear and free from impurities for use in the manufacture of nitroglycerin.

HEXAMETHYLENE TETRAMINE
Also called: methenamine
Form: colorless crystals
Chem. formula: C6H12N4
Sp. gr.: 1.33
Toxic effects: Toxic if ingested.
Notes: See M.S.D.S.

HYDRAZINE (anhydrous)
Also called: –
Form: colorless liquid
Chem. formula: H4N2
Sp. gr.: 1.04
Toxic effects: Vapor is toxic. Liquid burns both eyes and skin.
Notes: See M.S.D.S.

HYDROGEN PEROXIDE SOLUTION (6%)
Also called: –
Form: colorless liquid
Chem. formula: H2O2 solution
Sp. gr.: 1.02
Toxic effects: Liquid is an irritant to eyes and skin.
Notes: –

ISOPROPYL ALCOHOL
Also called: propanol 2, rubbing alcohol
Form: colorless liquid
Chem. formula: C3H8O
Sp. gr.: 0.78
Toxic effects: Vapor is an irritant to eyes and respiratory tract. Liquid is an eye irritant.
Notes: This rubbing alcohol must be clear and contain at least 70% isopropyl alcohol for explosive purposes.

KEROSENE
Also called: #1 fuel oil
Form: yellowish oil
Chem. formula: varies
Sp. gr.: approx. 0.8
Toxic effects: Toxic by ingestion. Eye irritant.
Notes: This material is standard fuel oil kerosene.

LEAD MONOXIDE
Also called: massicot
Form: reddish yellow crystals
Chem. formula: PbO
Sp. gr.: 9.53
Toxic effects: Dust is toxic.
Notes: See M.S.D.S.

LEAD NITRATE
Also called:
Form: colorless crystals
Chem. formula: Pb(NO3)2
Sp. gr.: 4.53
Toxic effects: Dust is toxic
Notes: See M.S.D.S. To produce a 34% by weight solution dissolve 1 lb. wt. of lead nitrate in 2 lb. wt. of warm water

MAGNESIUM OXIDE
Also called: magnesia

Form: colorless crystals
Chem. formula: MgO
Sp. gr.: 3.65
Toxic effects: Irritant to eyes, skin, and respiratory tract.
Notes: –

MERCURY
Also called: quicksilver
Form: silver liquid
Chem. formula: Hg
Sp. gr.: 13.54
Toxic effects: Vapor is toxic. Irritant to skin.
Notes: See M.S.D.S. Mercury from thermometers and mercury switches is acceptable for explosive purposes.

METHYL ALCOHOL
Also called: methanol, wood alcohol
Form: colorless liquid
Chem. formula: CH4O
Sp. gr.: 0.79
Toxic effects: Vapor is toxic. Eye hazard.
Notes: Denatured alcohol can be be used for any purpose EXCEPT the manufacture of methyl nitrate.

NITRIC ACID
Also called: strong water
Form: colorless OR yellow liquid
Chem. formula: HNO3
Sp. gr.: 1.50 if pure, 1.48 if 90% concentrated
Toxic effects: Vapor is toxic. Liquid burns all tissues.
Notes: Unless otherwise specified, "nitric acid" refers to 90% concentrated nitric acid with a specific grav. of 1.48 See M.S.D.S.

NITROBENZENE
Also called: oil of mirbane
Form: yellow liquid

Chem. formula: C6H5NO2
Sp. gr.: 1.20
Toxic effects: Vapor is toxic. Liquid is toxic through skin contact.
Notes: See M.S.D.S.

NITROMETHANE
Also called: –
Form: oil
Chem. formula: CH3NO2
Sp. gr.: 1.13
Toxic effects: Vapor is an irritant to the respiratory tract. Liquid irritates the eyes.
Notes: –

PARAFORMALDEHYDE
Also called: –
Form: white powder
Chem. formula: (CH2O)x
Sp. gr.: e.n.u.
Toxic effects: Irritant to eyes, skin, and respiratory tract.
Notes: –

PENTAERYTHRITOL
Also called: pentaerythrite
Form: white crystals
Chem. formula: C5H12O4
Sp. gr.: 1.38
Toxic effects: Irritant to eyes and skin.
Notes: –

PETROLEUM JELLY
Also called: vaseline
Form: yellowish jelly
Chem. formula: –
Sp. gr.: approx. 0.8
Toxic effects: Minor

Notes: This material is the standard petroleum jelly available at any drug store.

PICRIC ACID
Also called: –
Form: yellow crystals
Chem. formula: C6H3N3O7
Sp. gr.: 1.76
Toxic effects: Irritant to eyes, skin, and respiratory tract.
Notes: This material is explosive. See section on manufacturing picric acid for more information.

POTASSIUM CHLORATE
Also called: –
Form: colorless crystals
Chem. formula: KClO3
Sp. gr.: 2.32
Toxic effects: Toxic if ingested.
Notes: –

POTASSIUM NITRATE
Also called: saltpeter
Form: colorless crystals
Chem. formula: KNO2
Sp. gr.: 1.91
Toxic effects: Irritant to eyes, skin, and respiratory tract.
Notes: –

POTASSIUM PERCHLORATE
Also called: –
Form: colorless crystals
Chem. formula: KClO4
Sp. gr.: 2.52
Toxic effects: Irritant to eyes, skin, and respiratory tract.
Notes: –

SAWDUST (fine)
Also called: wood meal
Form: light tan powder
Chem. formula: mostly cellulose
Sp. gr.: varies
Toxic effects: Minor.
Notes: For use as an absorbent, sawdust must be dry and very finely powdered. Before using any sawdust as an absorbent, sift it through a piece of window screen. Use only the material that passes through the screen.

SILVER
Also called: –
Form: silver metal
Chem. formula: Ag
Sp. gr.: 10.50
Toxic effects: Dust is an irritant to eye and respiratory tract.
Notes: The metal must be pure silver for explosive purposes. Do not use "sterling" silver, as it contains a high percentage of copper.

SODIUM AZIDE
Also called: –
Form: white crystals
Chem. formula: NaN3
Sp. gr.: 1.85
Toxic effects: Dust is toxic. Irritant to eyes and skin.
Notes: See M.S.D.S.

SODIUM BICARBONATE
Also called: baking soda
Form: white powder
Chem. formula: NaHCO3
Sp. gr.: –
Toxic effects: Irritant to eyes and respiratory tract.
Notes: –

SODIUM CARBONATE
Also called: soda ash
Form: white powder
Chem. formula: Na2CO3
Sp. gr.: 2.53
Toxic effects: Irritant to eyes and respiratory tract.
Notes: –

SODIUM CHLORATE
Also called: –
Form: colorless crystals
Chem. formula: NaClO3
Sp. gr.: 2.49
Toxic effects: Irritant to eyes, skin, and respiratory tract.
Notes: –

SODIUM HYDROXIDE
Also called: lye
Form: colorless crystals
Chem. formula: NaOH
Sp. gr.: 2.13
Toxic effects: Material causes chemical burns. Respiratory and eye hazard.
Notes: See M.S.D.S.

SODIUM NITRATE
Also called: Chile saltpeter
Form: white powder
Chem. formula: NaNO3
Sp. gr.: 2.26
Toxic effects: Irritant to skin, eyes, and respiratory tract.
Notes: –

SODIUM PERCHLORATE
Also called: –
Form: colorless crystals
Chem. formula: NaClO4

Sp. gr.: 2.02
Toxic effects: Irritant to skin, eyes, and respiratory tract.
Notes: –

SUCROSE
Also called: cane sugar, table sugar
Form: colorless crystals
Chem. formula: C12H22O11
Sp. gr.: 1.58
Toxic effects: Minor.
Notes: This material is common table sugar.

SULFURIC ACID
Also called: –
Form: colorless liquid
Chem. formula: H2SO4
Sp. gr.: 1.83
Toxic effects: Vapor is toxic. Liquid causes chemical burns.
Notes: See M.S.D.S.

STARCH
Also called: potato starch
Form: white powder
Chem. formula: (C6H10O5)x
Sp. gr.: 1.50
Toxic effects: Minor.
Notes: Any standard cooking starch is acceptable.

TETRACHLOROETHYLENE
Also called: –
Form: colorless liquid
Chem. formula: C2Cl4
Sp. gr.: 1.63
Toxic effects: Vapor is toxic. Liquid irritates eyes and skin.
Notes: See M.S.D.S.

TOLUENE
Also called: methyl-benzene
Form: colorless liquid
Chem. formula: CH3C6H5
Sp. gr.: 0.86
Toxic effects: Vapor is toxic. Liquid is toxic through skin contact.
Notes: See M.S.D.S.

TRIETHYLAMINE
Also called: –
Form: colorless oil
Chem. formula: (C2H5)3N
Sp. gr.: 0.72
Toxic effects: Vapor is an irritant to eyes and respiratory tract.
Notes: See M.S.D.S.

TRINITRORESORCINOL
Also called: styphnic acid
Form: yellow powder
Chem. formula: C6H3N3O8
Sp. gr.: 1.82
Toxic effects: Information unavailable. Treat as a toxic material.
Notes: –

UREA
Also called: carbamide
Form: colorless crystals
Chem. formula: CH4N2O
Sp. gr.: 1.33
Toxic effects: Irritant to eyes, skin, and respiratory tract.
Notes: To produce a 20% solution, dissolve 1 u.b.w. of urea crystals in 4 u.b.w. of warm water.

WATER
Also called: –
Form: colorless liquid
Chem. formula: H2O
Sp. gr.: 1.00
Toxic effects: none.
Notes: Water for explosive purposes must be clean and pure.

WOOD CHARCOAL
Also called: –
Form: black powder
Chem. formula: C
Sp. gr.: varies
Toxic effects: Respiratory irritant.
Notes: Any black wood charcoal is suitable.

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